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EKO: ECONOMICS AND ORGANIZATION
OF INDUSTRIAL PRODUCTION

No. 2, February 1985

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20 May 1985

USSR REPORT ECONOMIC AFFAIRS

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No. 2, February 1985

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PROGRESS IN ECONOMIC EXPERIMENT RELATED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 2, Feb 85 pp 3-16

[Article by P. G. Bunich, corresponding member of the USSR Academy of Sciences, chief of the problem laboratory of the USSR Academy of Sciences under the USSR Council of Ministers (Moscow): "Experiment Over Distance"]

[Text] EKO readers are displaying a profound interest in the experiment, which is shown by the magazine's mail. They are asking us to discuss the major parts of the experiment, how its introduction is going, what is impeding it, and what suggestions and continuations there are. Some of these questions are answered by the article published below which utilizes normative and methodological documents, report figures and materials from questionnaires of executives and workers of economic services of a number of enterprises that are participating in the experiment (among them--the EKO questionnaire, the economics division of LITERATURNAYA GAZETA, and the Academy of the National Economy under the USSR Council of Ministers).

At its meeting in August 1984 the Politburo of the CPSU Central Committee considered the preliminary results of the economic experiment in expanding the economic independence and increasing the responsibility of the enterprises. On the basis of the experience that was accumulated, along with expansion of the experiment, it was recognized as expedient to provide for further improvement of some of its conditions. They had in mind consistent strengthening of cost accounting [khozraschet], strengthening the influence of the economic mechanism on the acceleration of scientific and technical progress, better utilization of all kinds of resources, and also more complete accounting for the specific features of the branches in which the experiment is being conducted.

In order to reach new economic heights, it is necessary to qualitatively restructure the economic mechanism and to activate the entire range of interests of the workers without allowing the profundity and complexity of the transportations to be replaced by cosmetic changes and nonsystemic random finishing touches.

The results of the radical changes in the system of management cannot be predicted ahead of time with any precision for one cannot predict all the changes in human behavior. The existence of this indeterminacy makes it necessary to conduct an experiment which will reveal the role of innovations directed toward improving the management mechanism and will also localize the risk. It is necessary only for the experiment to be representative in terms of the number of participating enterprises and the time of the experiment and for it to take place against the background of typical conditions. This will increase the degree of proximity of the experiment to the real economy, although even here one cannot but see a certain limitedness, a certain inadequacy of its characteristics to the overall dissemination of the new economic mechanism.

Beginning in 1985 the experiment, which initially included enterprises of five ministries, includes enterprises of 26 more ministries (in certain ministries, not all of the enterprises). As a result, the experiment will embrace approximately one-fourth of industrial production. The quantitative expansion of the sphere of the experiment is being combined with the introduction of certain adjustments into it. In machine building all products, and not just those certified for the Emblem of Quality, will be changed over to the system of state certification (previously they were included in the sphere of branch certification). Machine building associations have been given permission to pay for the labor of designers and technologists according to the example of the Leningrad workers who have introduced the Shchekino method for engineers. Incentives for increasing the production of products for export are being increased. Normatives for deductions from profit into funds for social and cultural measures and housing construction are increasing so that a larger part of the housing is "earned." In a number of machine-building branches normatives are being established for the reduction of material expenditures per ruble of output. For meeting these normatives it is intended to increase the funds for social and cultural measures and housing construction, and if these normatives are not met--the funds are to be reduced. In the Estonian SSR Ministry of Light Industry it is intended, economically and organizationally, to bring production, sales, supply and trade closer together.

This strengthening of the experiment is very important. But it does not exhaust the matter. The first continuation should inevitably be followed by others. For this it is very important to reveal what will be central in that which is earmarked in the experiment and what signifies a step in a principally important direction. And there is such a step. Not only the indicators, but to a certain degree even their underlying structure is being changed, not only the "mounted implements" and external attributes, but even the unionwide standards of the plan-incentive structure are being updated. It has been decided that the only way to earn a certain percentage of increase in the wage fund is by providing for an even greater percentage of increase in the normative net (or commodity) output. To accomplish this we have introduced normatives that are unified for the various branches for increasing the payment for each percentage point of increase in the results, which are "ironclad" like taxes on wages, and ratios, with which it is pointless to argue, for here there is not and cannot be any compromise. The increases in

the material incentive funds are made just as inevitably dependent on the increases in profit or the reduction in production costs. If one wants to live well one has to work and produce increases, accelerate scientific and technical progress, improve product quality, introduce this into the plan, and make it more difficult. At the same time one cannot pull the string too tight or it will break, the agreement will not be fulfilled, fines will be paid and part of the incentives will be lost. And so stimuli have been created for increasing the plan, and this is of decisive significance since it is precisely in the plans that the potential of our life lies. What is envisioned in them is mainly what happens. One can apparently not expect sharp deviations from the plan for better or for worse.

Judging from 25 questionnaires, an increase in output has been planned for 21 of the 25 enterprises. If one does not include the two enterprises with the smallest increase and the two with the greatest, the increase in the normative net output at eight enterprises will amount to 2.9 to 4.9 percent and that six of them--5.8 to 10.4 percent, and the increase in commercial output at three enterprises will be 1.4-3.3 percent. The average amount of the increase is considerably greater than in collectives that are not participating in the experiment. While previously all of the enterprises advanced at approximately the same modest rate, now the ones in the experiment are in the lead.

But even these increases are not the maximum possible. The funds for the development of production should be "pledged" for centralized capital investments. This is good, but it should not be forgotten that the investments have only begun and the first bank loans have been obtained for noncentralized needs. Facilities to be financed through noncentralized sources should be planned, constructed and assimilated, which requires time, and a good deal of it.

In order to make the increases greater, it is also necessary to improve the quality of the raw material, which, in turn, cannot be achieved immediately. At the Latvian Neringa Production Association for Cultural Goods they tell us: "In order to increase output it is necessary to have new equipment (lines for producing cans and packaging) and material resources. In terms of 1985 needs this would make it possible to increase the volume of output by a sum of more than 1 million rubles, a 2.5-fold increase over the counter plan adopted for 1984." In this same association more than 50 percent of the equipment for processing plastics and metal pressing equipment has been in operation for more than 10 years. The workers of the Kaluga Plant for Transport Machine Building say: "The capacities for producing blank parts are inadequate, there are not enough workers in the main occupations, and about 25 percent of the volume of commercial output has been produced for more than 10 years. It does not seem possible to reduce its production cost, and it cannot be removed from production because of the high demand for it in rail transportation. Twenty-five percent of the equipment has been in operation for more than 20 years." The Sibelektrotyazhmash Plant is complaining about a shortage of "pocket" money.

The inadequate increases are sometimes associated with the limited amounts of raw material. But there are enterprises which are trying to overcome this. The Neringa PO has made a suggestion to collect and process secondary plastics

in order to provide raw material for producing additional products. The Elektrosila PO intends to increase the output of products in 1984 in general without increasing the expenditure of metal.

To begin with the experiment encompassed mainly the primary units of the economy--the enterprises. The higher agencies, the VPO's, and the ministry staffs are continuing to work mainly in the old way. They are helping in the innovation mainly through understanding its importance. But the economic levers of the higher agencies are not being properly rearranged to accommodate the experiment. The same thing can be said about the partners of the enterprises participating in the experiment. The supply enterprises, the client enterprises, the material and technical supply agencies, transportation and energy supply organizations, scientific research institutes and planning institutions--all of them are functioning under the former conditions. Therefore the energy of the experimenters, to a certain degree, is drawn up into the void, and the new mechanism suffocates as it becomes more distant from the points of innovation. Previously, when individual reforms involved mainly reconstruction of higher units, this suffocating effect of the decisions took place as they came closer to the enterprises. The best variant produces a doubling of results, when the lower levels, upper levels and partners want to increase the effectiveness, when all units of management form a unified cost-accounting fabric. And the spreading of the experiment to the vertical and horizontal units of management is not far away.

Another complex of reasons for the delayed effect is the psychological barrier to whatever is new. A message to the Tbilisi Elektroavtomat Plant: "More time is necessary for the introduction of the experiment. The reason is the psychological aspect." The resistance of the human element is brought about by a lack of confidence in that the accepted wage normatives, and incentive funds, which are the same for the planning period, will be retained. But what will happen then? This bothers the Lithuanian Metallistas PO (Panevezhis): "The normatives for economic incentives have been set for 2 years, and this keeps the association from fully utilizing internal reserves." This fear is shared by the Production Association Elektrotekhnicheskii Zavod imeni M. I. Kalinin (Tallinn): "There is no confidence that under the next five-year plan the ministry will not refuse to plan according to the base." In order to eliminate those fears it is probably necessary to assure the enterprises directly and unambiguously that the new system is being introduced seriously and for a long period of time.

The subsoil for the old methods of management is psychological inertia. Let us see what the Tadzhikkabel' Plant has to say: "Planning assignments are not given to the enterprise before the beginning of the planning year, but during the planning year." The Elektrosila PO (Leningrad) also suggests forming a draft of the plan for production at an earlier time. The Neringa PO adds: "Although the number of indicators that are established has decreased, all of the indicators on the products list will continue to be planned and taken into account, and in 1984 even an additional indicator, 'Toys in Thousands of Units' has been added. Such indicators as commercial output, commodities made of plastic and processing of plastic impede flexible formation of the assortment plan." Variations on this same theme are contained in the responses from other enterprises that were questioned. The Kaluga Plant for

Transport Machine Building: "We are surprised by the fact that the planning indicators have remained the same as they were, and their range has not decreased." The Kaluga Machine-Building Plant: "In spite of the fact that the range of indicators that are established have decreased, the enterprise continues to be given a large number of indicators from above." The Riga Car Construction Plant: "The plan has already been increased (last year's debt was added)."

The area that is lagging behind is internal cost accounting. Informing each worker of the principles of the experiment depends on this. Here are a couple of typical responses. The Kaluga Plant for Transport Machine Building: "The system of internal cost accounting itself has not changed. But each shop, section and brigade has been given a schedule for releasing products in order to satisfy contractual deliveries, and if these are not met the collectives are deprived of their bonuses." The Azerelektroterm PO: "The system has not essentially changed so far. They have begun to plan for the shops the deliveries of components and the growth of labor productivity, which they did not do before the experiment." The Turkmenkabel' Plant: "They have not yet introduced a system of cost accounting in the sections and brigades." The Tallinn Estoplast Experimental Plant: "Certain changes have been made in the system of internal cost accounting."

It turns out that the main changes in internal cost accounting are the delivery schedules, the assignments for increasing labor productivity and, at a number of enterprises, also the assignments for reducing production costs. In the Neringa PO for cost accounting shops they have introduced the indicator of conventional profit, and when it is overfulfilled by 1 percent the material incentives increased by 4 percent. Internal subdivisions have not been given incentives for more difficult plans, and a small part of the funds for the development of production have not been given to them to distribute among themselves. Bringing up the rear, bringing internal cost accounting up to the forward line of external cost accounting--herein lies a large reserve for movement of the modernized mechanism of management.

The figures presented above concerning the increases rarely show, unfortunately, the increases as a result of the experiment. Perhaps these increases too have been as great or even greater in past years? Perhaps in terms of the five-year plan they exceeded the plan for 1984? A comparison of the volume of the normative net output with that of past years was conducted by the Elektrosila PO: the increase in 1984--8.3 percent, and the average for each of the 3 preceding years--7.2 percent. At the Bobruysk Leather Combine imeni 60-Letiye Velikiy Oktyabr', the increase in the volume of production during 1984 exceeded the average annual level for the five-year plan by 1.3 points, and labor productivity--also by 1.3. In the plan and the countercommitments of the Khabarovsk Dal'dizel' Plant in 1984 there was to have been a 1.3-fold increase in the volume of output, and the growth rates of labor productivity were to have doubled.

The experiment characterizes with a greater degree of precision the increase in the annual plan for 1984 as compared to the annual breakdown of the five-year plan if the counterplan for 1984 is larger than the one previously adopted. This increase (to be sure, without comparing it with preceding

counterplans) was calculated by the Neringa PO; the commercial output will increase in excess of the annual plan for the five-year plan by 1.4 points, profit--by 4.3, and labor productivity--by 1.3 points. At the Tallinn Experimental Plant the normative net output increased as compared to the annual breakdown of the five-year plan by 1.3 points, and profit--by 1.3, and labor productivity--by 1.4. In the Armelektrosvet PO labor productivity is increasing according to socialist commitments by 1.5 points, and production cost is being reduced by 0.6 percent. At the Bendery Moldavkabel' Plant the normative net output has increased by 0.6 percent, and the increase in labor productivity and the reduction of production costs are intended to be at the level recommended by the December (1983) Plenum of the CPSU Central Committee for all enterprises, regardless of the experiment. At the Kaluga Plant for Transport Machine Building and the Novocherkassk Electrical Machine Plant these indicators also basically coincide with the general recommendations.

There are various reasons for the difficulties in discovering the net results of the experiment. Not everyone knows how to determine them. The nutritive environment, the source of the indeterminacy is the desire of poor managers to cover up results that are not good enough and to show themselves in an advantageous light.

It is necessary to develop on time and to propose to all collectives a unified system for evaluating the experience, and one should make it incumbent on the enterprises to determine the results of the experiment in comparison to the annual plan which would have been achieved without the experiment. The results of the experiment can also be revealed by comparing them with the results of the work of similar enterprises that are functioning in the old way.

It is important to single out clearly and uniformly from the many indicators used in the experiment the main ones and the generalizing ones. If one bases the evaluation on particular indicators or on an arbitrary selection of criteria of effectiveness, it will be impossible to reach a conclusion or the conclusion will be unreliable, for various indicators at individual enterprises sometimes change in various directions, and in any event at various rates. Thus in one of the PO's that were questioned the increase in the normative net output amounted to 13.6 percent while in another it was 5.8 percent, that is, less than half as much. But the increase in profit in the former PO was equal to 27.6 percent, and in the latter--82.8 percent, almost 3 times as much. The increase in labor productivity was also brought forward by the first PO, where it amounted to 13.6 percent as compared to 1.9 percent in the latter.

If it is possible to become confused with three indicators, it is even more difficult to gain one's orientation with a large number of them, which include the production cost, material-intensiveness, proportion of products of the highest quality category, and so forth. The solution lies in dividing all indicators into synthetic ones, which reveal the picture as a whole, and analytic ones, which reflect particular aspects of the effectiveness. And these should not be in the form of an arbitrary classification of local indicators, but in the form of a system which covers the entire field of the effect, in which each of the indicators is evaluated in terms of the measure

of its influence on the final result, nothing is duplicated and nothing is left out. The generalizing indicator could be the dynamics of the increase in net profit (in percentages), that is, the dynamics of profit minus all of the payments to the state, the bank and the higher economic units. It seems that this indicator more than any other would reflect all expenditures of the enterprises, all of their income, all of their payments to the society, and all of the money left at the disposal of the enterprise for accumulation.

It is important not only to earmark an increase in the plan, but also to fulfill it. The facts show that the enterprises participating in the experiment fulfill increased assignments and, moreover, the fulfill them to a degree that exceeds the "usual." This is brought about by the fact that the incentive capabilities of the experiment were not fully mobilized immediately. There was a lack of confidence in the supply, not all of the mechanism was entirely understood, the custom of putting aside reserves had an effect, and so forth. Gradually the fear dispersed and the increased plans were significantly overfulfilled. This overfulfillment is a special part of the effect of the experiment.

Even more significant is the fact that the experiment has provided for an appreciable strengthening of contractual discipline. During January-August 1984 the fulfillment of contractual commitments, as compared to the same period of 1983, increased in the Ministry of Heavy Machine Building from 97 to 99.6 percent (the greatest jump), in the Ministry of the Electrical Equipment Industry--from 97 to 99 percent, in the Ukrainian SSR Ministry of the Food Industry--from 99.7 to 100 percent, and in the Belorussian SSR Ministry of Light Industry and the Lithuanian Ministry of Local Industry--from 99.1 to 100 percent. There are several reasons for this. First and foremost there was a stronger incentive to work well, and the sanctions against poor work were more effective. For fulfillment of the annual sales plans taking contracts into account managers of the enterprises receive a bonus in the amount of up to 3 times their salary in excess of the established limits, and the material incentive funds for these collectives are increased by 15 percent. If the agreement is not fulfilled (in excess of a small allowance), the managers of the enterprises are deprived of all of their bonuses for the basic results, and for each percentage of underfulfillment of contractual commitments the incentive funds are reduced by 3 percent.

The successful fulfillment of contractual commitments is explained also the attention paid to the participants in the experiment: documents earmarked for their supply were marked with the letter E. Collectives that were conducting the experiment were somewhat better supplied with transportation. If the purchasers of their products have no money, the bank pays for them (obtaining the money from the debtors later). With mass dissemination of the experiment these benefits will disappear, but at the same time there will be better conditions for supply as a result of changing the partner enterprises over to the new principles of management.

It is realistic to make the collective responsible for increased effectiveness only when it has given the right to affect this increase. And this is what is done. For example, enterprises of the Ministry of Heavy Machine Building have established for them directly in their five-year plan five indicators, two

limits and six normatives, and for enterprises of the Lithuanian SSR Ministry of Local Industry they established two indicators, two limits and five normatives. Previously these enterprises were assigned dozens of indicators. There has been a sharp reduction in the number of centralized assignments for producing products in physical terms. Thus for the Belorussian SSR Ministry of Light Industry this number has decreased from 124 positions to 24.

The experiment has enabled enterprises to take out twice their previously allowed amount in loans, and the time period for repaying them has also doubled. Permission for this is granted by the republic Gosbank offices (previously it the USSR Gosbank). The Belorussian SSR Ministry of Light Industry has also been given the right to established independently the wholesale and retail prices for experimental batches of items valued at up to 500,000 rubles and to delegate to production associations the right to determine the prices for batches valued up to 100,000 rubles. The possibility of rapidly making reimbursement for expenditures and increasing the incentive funds has enabled Minsk fine fabric workers to begin to deliver new pure wool coat fabric with thick nap as early as the first quarter of 1984.

Collectives have been permitted to increase the additional payments for professional mastery of highly qualified workers employed in especially responsible jobs to 24 percent of the wage rate (as compared to 12 percent previously). For this category of worker they can increase the salaries to 250 rubles a month (as compared to 200 rubles a month previously). The increments for highly skilled engineering and technical personnel and employees are being increased to 50 percent of the salary (their previous limit was 30 percent). While previously these payments could not exceed 1 percent of the wage fund, now the limit, which largely nullified the whole idea, has been removed. Brigades in which the number of workers is less than the norm receive a bonus of 10 points higher than the "typical" brigades. All these measures have increased the interest of the collectives to work with fewer labor resources--"not with numbers, but with ability."

Such are the possibilities. But in practice the picture is different. Certain enterprises are poor at introducing new technologies, have not determined progressive zones of service, have not been able to reduce the number of worker and have not created the savings on the wage fund necessary for their payment. The Tallinn Experimental Plant Estoplast has announced that the possibility of paying increments to specialists and workers are still being poorly utilized. The Alma-Ata Plant for Heavy Machine Building thinks that there are no possibilities of payment increments to specialists and workers since it is necessary to keep "superfluous" personnel for agricultural work and other measures that "eat up" the entire wage fund.

Fortunately, one finds more of those enterprises where the possibilities of payment are being utilized more fully. At the Elektrosila PO, for example, payments for combining occupations are received by 1.1 percent of the workers, personal salaries and increased additional payments to wage rates--8 percent of the highly skilled workers; increments for engineering and technical personnel and employees include 3 percent of them, and in the Sibelektroterm PO increments are paid to 10-15 percent of the industrial production personnel. The use of increments has reduced the tension in the balance of

labor and has led to an absolute reduction of the number of workers. Thus at enterprises of the Ukrainian SSR Ministry of the Food Industry the number of personnel has decreased by 1,500 people. At the same time labor turnover has decreased: from 18 to 5 percent.

The experiment raises a number of new issues. Their appearance ensues from the very purpose of the experiment, in which experience suggests what to increase, what to abolish and what to introduce additionally.

From the Kiev Confectionery Factory imeni K. Marx they announce: "The enterprises that achieved high indicators in 1983 are ending up in a worse position than those who completed the base year poorly." This conclusion is explained by the fact that the wage and incentive funds are increased in terms of the amount of increase in output and profit (reduction of production cost), and the greatest amounts of the latter are provided by collectives with unutilized reserves, and surplus of capacities and labor force, increased supplies of materials, and exaggerated norms for their expenditures. And for the collectives which "exposed themselves" long ago, large increases are impossible. They are also impossible for collectives which have achieved high degrees of return, record achievements, for each percentage of advancement forward is much more difficult than it is for those enterprises that stand in the middle or at the end of the line in socioeconomic competition. The increases are achieved by "Lilliputians" and they do not like "Gullivers."

It is time to move, if only experimentally, the pointer of the economic mechanism toward evaluating collectives not for the increase part of the result, but for the result as a whole, having established that their incentives are provided through the "breakdown" of the actual net output into the wage fund and profit (within the framework of the latter the incentive funds are formed after the payment of taxes). Incidentally: a one-time bonus for management workers of enterprises of the Ministry of the Electrical Equipment Industry for the output of products that met the best world and domestic standards is increasing, depending on the amounts of the economic effect and the proportion of products of the highest quality category. Providing incentives for export production also depends on its overall proportion, and not the increase.

According to existing provisions the reduction in the plans for the normative net output in the majority of branches does not lead to a reduction of the base wage fund. It is decreased only with a drop in labor productivity, but productivity remains the same when a smaller volume of normative net output is produced with a smaller number of workers. Under these conditions, even without increase the normative net output the collectives can be tempted to take a temporary reduction of this indicator in order to force it subsequently and obtain a weighty addition to the wage fund. Understandably, not everyone can succeed in this. It is not easy to reduce the number of workers. It is not simple to defend a plan in which the normative net output is dropping. But the abstract possibility of temporarily reducing the normative net output exists, and since it is advantageous, it is not ruled out for it to be transformed into reality. Perhaps within the framework of the experiment we should test at several enterprises the incentive for the overall level of effectiveness and not its component of growth.

The economic mechanism requires not only a correct system of management from the standpoint of its quality, but also optimization of the quantitative parameters. It is described not by "anatomy" alone, but also by "physiology," which does not all either increased or reduced "pressure." The time has come to refine many economic normatives, to coordinate them on the basis of the presumption of complete return of each ruble of expenditures and income.

Thus for saving on certain resources they pay 95 percent of the value of what has been saved, while for others they pay only 10-15 percent. As a result, the enterprises are directed not toward maximum savings of funds, but toward maximum remuneration, and they reduce the expenditure of resources from which they receive 95 percent of each ruble in savings, and they pay no attention to an overexpenditure of 6 rubles of other resources for which the total remuneration would be 90 kopecks.

Among other disproportions is the ratio between the penalties for the failure to meet agreements and the advantage from producing goods which are sold at prices that include increments. Thus light industry enterprises in the RSFSR in 1982 failed to fulfill an agreement by 1.9 percent. Their incentive funds were reduced by that same 1.9 percent. But as a result of overfulfillment of the plan for the output of goods sold with an increment to the price, the enterprises increased their incentive funds by 39.9 percent! One cannot but note that the exceptionally high incentives for the fulfillment of agreements and the sanctions for failure to fulfill them also have certain negative consequences: they motivate the workers to reduce the plans and amounts of required increase so as to guarantee them against failure when fulfilling the commitments. The quantitative measure of the incentive should be determined according to the actual effect.

The Chirchik Transformer Plant and the Azerelektromash PO are in favor of abolishing the limitation on the numbers and expenditures on the management staff. They can honestly say that the rigid limitations on the administrative and management staff forces them to "hide" this staff in the shops. For administration is necessary in any case.

A group of enterprises is raising the question of augmenting the branch segment of the experiment with a territorial segment, that is, including in the experiment one or another complete oblast or republic. Then the undisciplined worker whose level of requirements is not high enough will not be transferred to the neighboring enterprise and will not take the shortcomings of his presence from one place to another. He will have to be corrected. Educational work will also become more effective.

The course has been earmarked. Success will depend on us to a decisive degree. On the basis of the new experience and new ideas we shall develop a program for comprehensive improvement of the management mechanism which is adequate to the possibilities and demands of the stage of developed socialism,

and this means that it will lead in an extremely rapid way to a cardinal increase in the effectiveness of production and the standard of living of the people.

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FUTURE OF COLLECTIVE CONTEMPLATED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 2, Feb 85 p 17

[Introduction to articles that follow]

[Text] It seemed interesting to us to trace the selection made by a regular enterprise (association) when the time had come for changes. It could wait, timidly reminding the ministry that the plant was old, the equipment worn out, the models were not the latest word in scientific and technical progress, science was out of the picture, the associates were upset...or it could gather its forces and "pull itself up by its bootstraps," orient itself toward worthy goals.

This is precisely the mood we encountered in the Voronezh Production Association imeni Kalinin which produces forge and press equipment. This is not VAZ and not KamAZ. In terms of sizes, capabilities, capital investments and ties this is indeed a completely "ordinary" association.

This makes its experience and its plans even more interesting. These are discussed in the selection that is being offered.

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MODERNIZATION OF PRODUCTION ASSOCIATION DESCRIBED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 2, Feb 85 pp 18-29

[Article by A. G. Krupenko, general director of the Voronezh Production Association imeni Kalinin for Producing Forge and Press Equipment: "In the Live Rhythm of Renewal"]

[Text] Specialization With Adjustments

Any enterprise is faced with a dilemma: either to operate without sharp leaps and changes, trying not to be distinguished in any way and not to risk anything, or to actively introduce innovations into production. We have chosen the second path, and we are striving to combine dynamic development of the enterprise with stable operation, a progressive technological course with economic substantiation. Although under the conditions of our subbranch this is extremely difficult.

It is typical of enterprises of forge and press machine building to have many products produced in small series. And our association now produces about 1,800 machines a year (mainly sledgehammers, mechanical presses and rolling presses) of almost 80 kinds and 18 technological groups. Only two to three models are produced in series of from 150 to 600 a year, several machines--from 10 to 50, and the majority--from 1 to 10. The volume of output of products increases from year to year. Constantly operating under such difficult conditions, the production association regularly fulfills its plans (and the increase in the volume of product output takes place largely as a result of increased labor productivity), and there are no outdated models in the products list.

The path to stability was neither simple nor easy. It is worthwhile to recall that critical situation which existed at the end of the 1960's. After 1959 the plant had no appreciable increase in production areas. And the volume of output had increased sharply by 1970. There was an "explosion" in the products list. By that time the enterprise had assimilated more than 100 kinds of machines and was producing both mechanical and hydraulic equipment. The areas of the shops were more than doubly overloaded. Production became uncontrollable and the plant stopped fulfilling the plan.

The only escape from the situation that had been created was provided by the reconstruction which was carried out in the 1970's. During these two five-year plans the plant was rejuvenated, it grew and it became a production association (we constructed five buildings on the previous territory and the first section of a specialized branch plant for producing press units in Novokhopersk, and almost 50 percent of the equipment for the basic production was updated). During the reconstruction a powerful impulse was provided, which accelerated the development of the enterprise and determined all of our current tendencies. It was necessary to work hard (the reconstruction was carried out under the conditions of active production, the planned assignments increased; during the time of the reconstruction--from 1970 to 1980--the volume of output of products increased by 62 percent). But the collective had successfully solved an entire complex of long-range technical and economic problems.

A course was taken toward intraplant specialization. To begin with, we decided to bring as much order as possible into the products list that was expanding out of control. We rejected the production of hydraulic equipment, concentrating efforts on the development of the production of mechanical presses and sledgehammers. We tried to consolidate the series with the help of production grouping that is carried out with the agreement of the consumers: this year, for instance, we are producing 1-ton hammers, next year--2-ton, and so forth.

But even in today's somewhat more orderly form, our products list still limits the possibilities of deepening specialization. We are still unable to reject our own autonomous billet production and use only pieces that are delivered from central smelting and forging organizations. And we have to expend a great deal of effort in order to bring this production in line with the requirements of modern technology and with the level of the basic production. We were among the first in the country to assimilate the technology of smelting iron in electric induction furnaces, and by 1986 we intend to fully change over to this method of smelting and get rid of the hearth furnaces. These and many other measures have made it possible to raise the level of mechanization and automation of auxiliary production to 66.6 percent (in basic production it is 70.2 percent). But the billet production is still developing more slowly and is not operating stably enough. So far it is not abreast of the basic tendencies in the interest plant specialization. Here we have not managed to combine progressive technology with progressive forms of labor organization.

The principle that is observed most consistently is that of intraplant specialization in the machine assembly production. Before the reconstruction the specialization of the sections was basically in terms of operations. During the process of metal processing and assembly the components and parts traveled through all of the areas, from section to section, taking up space; and the quality of the parts frequently deteriorated this way. The appearance of sections with a closed production cycle for a particular object made it possible to concentrate within their frameworks the entire process of working and assembly of many parts and components. Within the closed cycles for particular items they have retained the operational specialization, but with elements that are new for us. For example, we have separated the finishing

machines on which we do only the final processing of the parts which provide for the tolerance norms of precision. For the finishing processing the enterprise has acquired much special, unique equipment (it was necessary to reject the fairly widespread prejudice that under our conditions only universal metal-cutting machine tools would be effective).

In the closed sections for particular objects it turned out to be most natural for the workers to operate numerous machine tools and to apply the brigade form of labor organization. In the association there are now 44 collectives of machine tool operators, and not all of them are equal, but they have all accepted the brigade form and the principle of operating more than one machine tool. Managers of the shops have managed to find people who are capable of becoming leaders of the movement. Among the first in the fourth mechanics shop in the section for finishing work on shafts for presses they have organized a brigade under the leadership of Pavel Aleksandrovich Vacil'chenko. All members of the brigade have mastered related specialties and have increased their qualifications; because of this a section which previously caused the shop to operate feverishly, is now operating stably. But this is not the main thing. Managers of the shop and association value Vacil'chenko's brigade primarily because of its desire to constantly grow. The collective has set difficult problems for the engineers and forces them to think about paths for further development of the entire enterprise. P. A. Vacil'chenko was one of the initiators of the creation of plant courses for increasing qualifications and the technological literacy of the workers. At the suggestion of this collective the specialists are beginning to develop models of long-range planning for the labor of brigades. When Vacil'chenko's brigade began to be idle because of the fact that other sections did not always manage to provide them with work on time, the engineers had to revise the entire technological process for processing shafts, which had been done in a strict sequence. It turned out that it was possible without harming the quality of the products to change the sequence of certain operations. Thus they found an additional possibility of stabilizing the shop's production rhythm.

And recently the developing collective gave us another task. The qualifications of the brigade had increased so much that there was not enough work for them in their own section. Life had intervened in the organization of labor: one worker got married and left, a second was discharged soon after that, and the remaining five decided to take care of all nine machine tools in the section by themselves. But the unexpected problem situation was not forgotten, and was analyzed by the engineers. Will the brigade not finally outgrow the framework of the possibilities of the closed cycle for a particular object? And how will this influence the further development of specialization?

The appearance of such problems shows that the brigade form has become not simply an extension of closed cycles for particular objects and it has not only helped to stabilize the operation of the shop, but is itself developing actively, stimulating creative thought. This, in my opinion, is evidence that the mechanism for the development of the enterprise was not deformed and continues to function normally.

Oriented toward constant development without interruptions, we are experimenting, augmenting and "adapting" innovations to the conditions of our enterprise, trying to listen to what is suggested by the practice of development.

As far as I know, machine tools with numerical program control are being used effectively far from everywhere. When during the course of reconstruction we decided to introduce them, there were still no optimistic examples in small series production. Naturally, we did not immediately find the technological scheme that was most compatible with the course toward specialization. For a certain amount of time we introduced machine tools with numerical program control in several sections in the machine shops, having selected for them a list of products consisting of small and medium series parts (when these machine tools are used to process parts with complicated configurations--cams, sabers, crankshafts, flanges--labor productivity increased fivefold). When creating the programs specialists of the association managed to concentrate the technical process and to reduce the number of operations. Because of this, one operator serves two machine tools with numerical program control.

The plant has now singled out a large section where almost all the machine tools have numerical program control. We have managed to achieve several advantages here. From this section we have "completed" high-quality parts, and optimal conditions have been created here for operating more than one machine tool. And the main thing is that we have managed to restore in the enterprise workers an interest in the occupation of machine tool operator, and to give it prestige again. Working in the section are youth, plant old-timers and universal machine tool operators. It is typical that it is the latter that most frequently turn to technologists--and on the basis of suggestions from the workers, on the basis of their experience, the programs for processing parts are adjusted and perfected.

Perhaps it is also because this experience is developing dynamically that from the very beginning it was, if one may express it this way, humanized; during the assimilation of the machine tools with numerical program control the engineers looked for variants that make it possible to provide for the quickest and least damaging psychological adaptation of the worker to the new machine. In any event specialists of the head technologist's division explain the success largely by the active participation in the introduction of machine tools with numerical program control of the highly skilled, respected boring machine operator, Valentin Alekseyevich Yevseyev. The circumstances shaped up so that it was precisely at this time that Yevseyev was engaged in boring small parts which they intended to transfer to the machine tools with numerical program control. It probably meant a good deal that Yevseyev was working on "time rate"--piece-rate payment stimulates productivity, but it does not always help during the experiment. With the help of the worker, the technologists developed the technical process and the norms. Yevseyev's interested attitude toward the new equipment accelerated the introduction: the workers crowded around the machine tools with numerical program control, and Valentin Alekseyevich helped to master them. The head technologist's division drew conclusions from their "discovery" and now with especially responsible undertakings they always rely on the assistance of qualified workers who are not indifferent to innovations and who have the confidence of

others in the collective. It was with the support of the leading workers that we managed not only to arrange effectively the work of the section where the majority of machine tools with numerical program control were introduced, but also to successfully "build in" the largest equipment with numerical program control into the existing technological flow lines for processing the base parts.

Obviously, this experience will also be utilized when assimilating the unique automated line for processing especially large base parts, which will be put into operation in 1986. We have now begun its installation.

As was the case with the introduction of other innovations, the appearance of the automated line will make it possible not only to solve a number of current production problems (for example, we will no longer need to overload equipment for processing the base parts). It will set for us complicated new problems which call for creativity, and it will force us again to make adjustments in our specialization, in the development of technology and in the organization of labor. And this is natural: specialization should not be turned into a limiting factor, it should not narrow the possibilities of development.

Between Two Specializations

Even during the time of the reconstruction, in order not to slacken the rate of development that had been established, the managers and leading specialists of the association formulated this task: every 5 years a new type of machine should appear on the products list. The association has a fairly strong head designer's division (more than 90 percent of the developments for the enterprise are carried out through its own forces), but in spite of this we are not "enclosed within ourselves," and we actively cooperate with scientific research institutes, VUZes, specialized design bureaus and with the head institute of our subbranch--All-Union Experimental Scientific Research Institute of Forge and Press Machine Building (ENIKMASH) and other collectives. Along with scientists we participate in theoretical research which enriches the horizons and thinking of production workers, and during the course of this research ideas appear which help to improve our forge and press machines.

Presses are updated and modernized especially frequently. The handlers have the most stable design. Previously it was thought that hammers would "go out" fairly soon and therefore the designers did not devote much attention to them. But the hammer has turned out to be viable and is included in the most modern technological complexes. The old-timers in our products list are pneumatic forge hammers which the enterprise has been producing since 1943, and during the past decade they have been produced with the State Emblem of Quality. Scientists of the Voronezh Polytechnical Institute help us to keep these models on a modern level.

During past years several promising new types of hammers have also appeared. In cooperation with the Voronezh Specialized Design Bureau for Forge and Press Machines, we have created and assimilated high-speed hammers, including for dynamic pressing of metal powders. Along with scientists of the MVTU imeni

Bauman we are developing a design for a stamping hammer which is equipped with gas hydraulic drive and program control.

Our association has become the head association in the subbranch for producing forge rolling presses. We have mastered the production of 30 type sizes, and work for improving this equipment is continuing, mainly in conjunction with the ENIKMASH and the Rostov Institute of Agricultural Machine Building. In conjunction with the Rostov workers we are investigating the energy engineering of drives, and with the ENIKMASH we have developed parametric series of two-cell and roller-segment rolling presses.

Today our forge and press equipment is exhibited at many Soviet and international fairs, and many machines (especially sheet-stamping machines) built for export, including two such industrially developed capitalist countries as France, England, Italy, Sweden and Canada. In terms of speed, reliability and technical design, they are on a level with the best world models.

But, unfortunately, the association, like other enterprises of the subbranch, is not yet in a position to be oriented toward a specific consumer. We deliver to our clients presses with a very limited selection of spare parts, without technological fittings, and without sets of stamps (they are made by another plant). Intuitively, relying on fragmented information, we sometimes guess what kinds of products the clients expect from us and created models that correspond to these demands, but so far there is no system that enables us to constantly predict the demand. When changing over to the output of special-purpose products that are oriented toward a specific demand, it will be necessary to be flexible, to be able to readjust production rapidly and, possibly, to go frequently beyond the framework of the existing specialization. It is difficult to say when this changeover will take place, but many recognize the need for it.

Today we are going through a kind of preparatory period--we are producing equipment with means of mechanization and automation. Now 75 percent of the plant designers are dealing with problems of automation, and the majority of developments carried out in conjunction with scientists are associated with these. With the help of scientists of the ENIKMASH our association was the first in the subbranch to begin to produce robotized complexes.

Under the past five-year plan we used means of mechanization and automation to produce mainly the KD 2330 series single-crankshaft press with 100-ton force. On the basis of this press we created an entire family of mechanized machines and complexes--with the application of various improvements, including robotization. The majority of technological operations performed on this press are mechanized and automated.

By 1986 we plan to equip all of the kinds of press and rolling mill equipment we produce with means of automation and mechanization; this will also be done comprehensively. The proportion of machines with means of mechanization will reach more than 40 percent of the overall volume of output.

Increasing the output of automated equipment for our association is inevitable. Having exhausted the possibilities of expansion of the production areas during the time of reconstruction, the association entered on the path of intensive technical development. Providing the equipment with means of automation makes it possible to increase the overall productivity of forge and press machines without increasing their output and with expanding the area.

And although this course seems quite logical, we frequently have to go against the current. Having begun to produce robotized complexes, the association began independently to assimilate the production of robot equipment since nobody was producing it yet. The enterprise went beyond the boundaries of its specialization and experienced all the difficulties related to this. Numerous deliveries of batching were interrupted, and in the section for robot equipment where it was intended to do only its assembly work it was necessary to manufacture many parts.

When as a result of increasing the output of automated complexes we reduced the production of "stripped-down" presses, we were reproached for making cuts in the products list. The mechanism for planning still stimulates "quantitative" development. Even the draft of the plan for 1985 still envisions increased output of machines without taking into account whether they are equipped with means of mechanization and automation or not. And in this situation the association, striving to take the progressive course, is constantly risking its production stability.

Many doubts were expressed: they said that it was premature to develop robotization--the consumer was not ready (having begun to be oriented toward the consumer, did we really get ahead of his demand?!). But how could he prepare for robot equipment without seeing it? Indeed, many enterprises refused to accept the automated complexes they had ordered previously, blaming it on a shortage of production space, the lack of training of personnel, the quality of the robot equipment and so forth. But there are also other examples--our complexes are operating effectively in the Voronezh Elektrosignal Production Association and at several other enterprises. I think that all the rest of them are experiencing a need for automation and robotization of production.

Recently, when this article was being prepared, we became aware of the materials of the conference which was held by the Soyuzkuzmash VPO and the planning agencies. Representatives of ministries and departments which are the main consumers of forge and press equipment also participated in it. They analyze several tendencies in the utilization of equipment and came to the conclusion that it is necessary to increase the output of automated equipment and that this area should become the main one in the development of forge and press machine building. It is a pity that we had to wait almost 8 years for these conclusions, maintaining a balance between dynamism and stability.

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BIOGRAPHY OF FORGE AND PRESS ASSOCIATION RELATED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 2, Feb 85 pp 26-28

[Article: "Landmark of the Biography"]

[Text] 1892--A metal shop was opened on the outskirts of Voronezh in a small shed adjoining a one-story log building.

1899--In the city office they obtained permission to call the shop a "mechanics and iron-smelting plant." The owners were Ivanov, who had purchased the building along with the yard and the shops, and his companion, the entrepreneur Veretennikov. There were about 50 people working at the plant, many of whom were under police supervision as being politically suspect.

1905-1917--The workers of the plant initiated a number of strikes and demonstrations in Voronezh, and made a number of economic and political demands. In 1905 they achieved a reduction of the working day to 9 hours. In that same year of 1905 they protested against the tsar's punishment for the peaceful demonstration of the workers in St. Petersburg; in 1906 they refused to elect the individuals authorized for the State Duma; in 1907 they protested against the judgment of members of the social democratic faction of the Second State Duma.... Special surveillance was established for the plant. From the materials of the local police administration: the workers of the Voronezh Plant of Veretennikov are gathering in the field at dinnertime and hearing speeches from orators who come there.

1918--The plant was renamed at a "joint stock company." General management was provided by the factory-plant committee, and technical and commercial management--by the director. The plant produced cast iron and chaff cutters, and repaired agricultural machinery. The plant staff included 95 workers, nine employees and two engineering and technical specialists.

1925--The provincial Sovnarkhoz took control of the plant and introduced into the cooperative staff its own engineer with the rights of the director of the enterprise.

1930--The plant was given the name of M. I. Kalinin. The casting production was still profiled.

1937--The plant became the first specialized enterprise of the new subbranch of forge and press machine building, which delivered equipment for the automotive, tractor and aviation industry as well as for other machine-building enterprises.

1940--In an order of the people's committee of heavy machine building the Plant imeni Kalinin was recognized for its success in the fulfillment of production assignments, the creation of new designs of machine tools and machines and the development of the Stakhanovite Movement. The plant reconstruction was coming to an end. In 1941 it was suggested that the output of presses be doubled as compared to 1940 and that they assimilate eight new type sizes of machines, automated equipment and semiautomated equipment.

October 1941--The decision was made concerning evacuation.

February 1942--The plant began to produce products during the evacuation (in Chimkent). The foundry began to operate before it even had a roof. From the city and the auls, 478 people came to the plant and the Kalinin workers trained them in various occupations.

April 1943-July 1944--The enterprise founded by the Kalinin workers (now an automated press plant) continued to operate in Chimkent. The Plant imeni Kalinin was restored in Voronezh. From the plant report of 1943: "The plant has two horses valued at 4,000 rubles, three machine tools and wooden molds worth a total of 9,000 rubles. All the production buildings have been destroyed. The models are being produced in a garage where the only one of the necessary instruments and devices available is a belt saw."

2 July 1944--The Voronezh newspaper KOMMUNA wrote: "The collective of the Plant imeni Kalinin has won a great victory--in the restored shop, 4 months ahead of schedule, they manufactured the first pneumatic forge hammers." These were new machines for the Kalinin workers."

1966--The plant was awarded the Order of the Labor Red Banner.

1971--The plant was the first in the subbranch to prepare for certification for the State Emblem of Quality for the MB 4134 pneumatic forging hammer.

1976--A production association was created, which included the Plant imeni Kalinin and the Novokhopersk Plant for Press Units.

1977--The head plant was given the title "Enterprise of High Art of Production" and was the first in the subbranch to begin to produce automated complexes for sheet and stamped metal production.

1976-1984--The production association was declared to be the winner seven times in the All-Union Socialist Competition, was awarded the Challenge Red Banners of the CPSU Central Committee, the USSR Council of Ministers, the AUCCTU and the Komsomol Central Committee and the Memorial Badge of the CPSU

Central Committee, the USSR Council of Ministers, the AUCCTU and the Komsomol Central Committee "for high effectiveness and quality of work under the 10th Five-Year Plan."

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IMPORTANCE OF QUALITY CONTROL STRESSED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 2, Feb 85 pp 30-38

[Article by K. V. Sudilovskiy, chief of the division for technical control: "Quality in 100 Measurements"]

[Text] The level and capabilities of an enterprise, its image and its art of production are judged first and foremost by the quality of the products that are produced. Almost 20 years ago we recognized the need for planned control of this indicator--and since that time a system of quality control has been in effect at our enterprise. It has absorbed and creatively reworked the progressive element in the experience of enterprises of various branches in Saratov, Lvov, Gorkiy, Yaroslavl, Moscow, Minsk and Kremenchug. We began with a system of defect-free manufacture of products (BIP), it was transformed into a system of defect-free labor (SBT), and then into a comprehensive system of quality control of products (KS UKP) which we were the first in the branch to develop and introduce. The system as a whole has expanded and each preceding one became one of the stages of the latter. The main goal--providing for high product quality--has remained the same, but the very concept of quality has become deeper and its extreme parameters have been conceived on a larger scale. During the process of development of the system we recognized the truth that the main judge of the enterprise's products is the consumer. All this force us to look for effective forms of control and stimulation.

Not To Lower Criteria

The release of the product with the first presentation is a universal qualitative indicator. We value in it mainly the possibility of direct, uncompromising evaluation of the labor of the workers. At our enterprise we began to use it 20 years ago, in the stage of the introduction of the system of defect-free manufacture of products. And it is still the initial indicator. In all of the shops we have introduced daily accounting for the release of products with the first presentation, which not only helps to determine the amounts of the monthly bonuses precisely and efficiently, but also, in combination with means of visual agitation, itself becomes a kind of moral stimulus (if there has been defective work, on that same day on the "screen of indicators" next to the name of the guilty party we place a blue triangle, and the whole shop knows about the defect).

The system of incentives is constantly being updated. Today, for example, we are not very happy with the fact that in the mechanics' shops with large-series output of small parts 39 percent of the bonus increments are to go for 96-97 percent of the products that are released with the first presentation. This means that during the course of a month a machine tool operator can have defects in 300 out of 9,600 parts and still receive almost a complete bonus! Obviously we shall increase the "price" not only of each percentage of output released with the first presentation, but also the 10th parts of it.

Strict accounting for the release of products with the first presentation and incentives for this led to a situation where the number of workers at the enterprise who met the initial criterion began to increase. And this made it possible to take advantage on a large scale of the right to self-supervision and the personal stamp--now 15 percent of the workers, six brigades and four sections have been changed over to self-supervision.

The economic sense in applying mass self-supervision is obvious. In mechanics shop No 4, where an especially large number of workers have been changed over to this, the proportion of products released with the first presentation is higher than in the plant as a whole (96 percent). In this same fourth shop they found it possible to eliminate one controller.

We are trying to take advantage of all of the possibilities of the initial criterion, relating it to other indicators and stimuli. Thus the proportion of products released with the first presentation is taken into account when preparing for certification with the Plant and State Emblem of Quality and when determining the shop quality coefficient.

The quality coefficient. This criterion appeared in the stage of the introduction of the system of defect-free labor, when searching for a way of evaluating the labor of engineering and technical personnel. With the help of this each month we determine the quality of the work of collectives of the main and auxiliary shops, and on the basis of this we evaluate the labor of engineers and managers of the shops. We strictly rank all possible omissions in the work of the shop on the scale of the coefficient. We evaluate each indicator clearly, down to the hundredth of a point, in comparison to the established limits. If the shop has reduced the volume of output released with the first presentation, for each percentage of reduction we subtract 0.03 points from the coefficient. For receiving complaints--from 0.05 to 0.1 points. If the losses from defective work in the shops are 5 percent greater than the average monthly losses for the preceding year or the established limit, the coefficient is reduced by 0.05, if the aforementioned threshold exceeds 10 percent--by 0.1, and so forth.

On the scale of the coefficient the requirements of the art of production have been combined with the concept of quality:

cleanliness and order in the shop, maintenance of the work station;

observance of the rules for storage of the parts in the shop;

conditions for storing technical fittings and adapters in the sections.

The importance of each of these conditions is equal to the main indicators that are directly related to quality.

The coefficient has been in effect for 15 years now and has not yet become a "closed" structure: the system of its indicators is expanded depending on how high our requirements for quality are. Now, for example, there is a need when determining the coefficient to take into account how the schedule for checking the measurement instruments is.

If the amount of the coefficient turns out to be less than 0.8 the bonus for the engineering and technical specialists of the shop is reduced and the shop cannot claim first place in the plant competition. There have been cases in which at a meeting of the trade union committee, because of this not a single one of the main shops were awarded first place, although the other production indicators work high in some of them.

The maximum amount of the coefficient is 1, but it cannot be reached yet. We deliberately programmed this gap as a stimulus for growth.

The Emblem of Quality. In order to analyze what the experience in certification for the State and Plant Emblem of Quality has meant to us, it is necessary to turn to a story with an almost dramatic beginning.

We were preparing our best machine--the MB 4134 pneumatic forging hammer--for certification in 1970. To the surprise of many, the plant commission did not accept this hammer. It was established that the quality of a number of the parts were technologically not guaranteed and did not meet the precision norms that were made stricter because of the certification. (Now we insist on relating the concept of quality to precision, but 14 years ago there was the widespread opinion that for forging and stamping equipment high precision was not necessary; becoming accustomed to nonmandatory observance of the parameters but to a reduction of the durability of the machines.)

We worked for almost a year to prepare the hammer for a repeat test. We studied the experience of the Moscow Automotive Plant imeni Likhachev (now the AvtoZIL PO) in plant certification of parts and components, and decided to apply it, having adjusted it taking into account the specific features of small-series production. We conducted certification of 56 parts of the hammer, completed the equipment for 23 operations, acquired a vertical homing machine tool which provides for precision processing, reworked seven technological processes, and carried out another 28 various measures. At the same time a group of designers began to work in the head designer's division. This group made its adjustments to the external appearance of the hammer (incidentally, this was the first machine with improved design of all those that had been submitted for certification in our country). Only after this did we--the first in the subbranch--receive the first State Emblem of Quality.

It was then, after a difficult test, that we determined the main principles for plant certification. It is impossible to certify all or the majority of design elements at our enterprise--there are hundreds of thousands of them.

About 3,000 parts which determine the precision of the machines should be certified, with the observance of the following conditions:

the established, permanently operating technological process;

the correspondence to the blueprint and the technical specifications;

the manufacture according to the defect-free system;

release with the first presentation of no less than 98 percent of the products;

a high art of production in the section.

During the time of preparation for certification we experienced a need for well-arranged feedback from the consumers. We began to send lists of questions in which we asked them to tell us how the forge and press equipment was operating.

The enterprises which had become the largest consumers of our machines (VAZ, KamAZ, Voronezhskel'mash, the Voronezh Avtogenmash and the Plant for Ore-Enriching Equipment) quality support points were established. From these the association began to receive more complete information, which was used to modernize the designs and to change the technological process.

By placing stricter requirements on the products, the association strive to become an enterprise capable of guaranteeing stable quality. And it is as a confidence that we regard the right that has been granted to us to certify a range of machines not completely, but in terms of their standard representative.

In 1979 two decisions were made concerning changing the policy for certification. The enterprises of the country were permitted to submit products for the Emblem of Quality no later than a year, and for especially complicated products--no later than 2 years after the beginning of their series production. But our association was given the right to submit the installation series and even experimental models of machines.

In my opinion, it is very difficult to guarantee the quality of machines of the adjustment series (that is, beginning with the second or third unit from the beginning of the output) and in principle it is impossible to guarantee an experimental model. Still the quality must be demonstrated and verified. True, we had not received complaints on the consumers about certified experimental models, but the risk is too great.

Why were we granted such an indisputable right? The main reason is the planning of a constantly growing proportion of products with the Emblem of Quality. And how does one provide for an increase under our conditions, when the output of machines can be limited to the adjustment batch and the experimental model? Yes, we were given the right to give a guarantee for something that cannot be guaranteed. And we had to do this in order to provide for the "quantity of quality" plan for us. I do not think that there

is any need to show that such compromises stand in contradiction to our course and certainly do not contribute to bringing the manufacturers closer to the consumers.

Obviously, it is necessary to critically review the principles of planning the output of products with the State Emblem of Quality.

Today the Technical Control Department Is the Informal Leader, But Tomorrow!..

Many specialists thought and still do think that the general management of the system of quality control should be provided by the division of technical control. Perhaps this is because the OTK [division of technical control] up to this point is actually more interested than any other in improving product quality, and the other subdivisions and the managers of the enterprise are now more interested in quantity. It was the OTK that introduced the systems of BIP and SBT at our enterprise and developed the provisions concerning the coefficient of quality and the first standards for the KS UKP; it even began to organize certification and distributed the first sheets of questions.

But here it was necessary to make decisions that went beyond the limits of the authority and the competence of the OTK. And gradually many divisions were enlisted to participate in quality control, and it became necessary to create new subdivisions. From the head designer's division we singled out the design-technological division for standardization, which took on responsibility for the development and improvement of standards and control over their observance; within the head designer's division there appeared a group for the reliability of equipment which carried on a dialogue with the consumers, a support point for state testing, and a group for normative technical documentation which engages in the development of documents for certification. The plant certification commission included the chiefs of the division for technical control and the design-technological division for standardization, the head designer, the head metallurgist, the head metrologist and representatives of the shops and the public.

Thus the system of quality control is becoming a common concern for many subdivisions of the association, and the OTK is forfeiting its role as a not always authorized leader, but is retaining its significance as an ideological and informal leader, the "director" of the system, continuing to coordinate affairs and plans of many collectives with the problem of quality, and monitoring and adjusting the effect of the main criteria.

The role and status of the OTK tomorrow, possibly, will depend on those essential changes which are taking place in the specific features of the division. Increased requirements are being placed on technical control, its functions are being combined with the functions of quality control, and the preventive aspect is becoming stronger. The OTK staff now contains controllers who analyze each case of defective work (a unified detailed program has been developed for analysis from 49 points). Figures from the analysis are submitted for generalization to the OASU, and the most frequent causes of the defects are determined. They become the subject of discussion at plant and shop "days of quality." A positive program is being earmarked,

and the technology is being adjusted on the spot. This kind of constructive approach corresponds to the logic of the system for quality control.

The control foremen and the controllers of the shop BTK's have been given additional responsibilities: along with the production foremen they are to check on the observance of the technology, the correctness of the application and the suitability of the fittings, adapters and instruments, and they are also to train young workers.

One cannot say that the OTK was fully prepared for these or many other complicated tasks. The main obstacle was the qualifications of the control staff. As a rule, the people working as controllers are either school graduates who have completed a year's technical school and have not yet entered the VUZ or they are workers who have been transferred to lighter work because of their health. But today we need control engineers. But is this possible with the current incentives? For the most skilled controllers the wages are 124 rubles.

We decided to revise the conditions for awarding bonuses to controllers and we are trying to apply the brigade form of labor organization in the OTK. In the shops we shall create brigades of controllers and to begin with we shall ask engineers and technicians from the divisions to work in them. They will be the ones who deal with intelligent control and in-depth prevention. It will also become possible to reduce the number of workers and to increase the pay for skilled personnel. The experiment which we intend to conduct at several shops will show whether or not we will succeed in all this.

Recently representatives of the Gosstandart, having analyzed the experience in quality control in our association, suggested that we increase intake control. Indeed, the OTK inspects only a few of the batching items, mainly those whose condition can deteriorate on the road). But the majority of defects are discovered in the shops, when the parts arrive for processing, assembly and testing of the machines. The quality of the deliveries is a large problem and, unfortunately, so far it is almost uncontrollable. But is it worthwhile to solve it by expanding the intake control? And to what extent should it be expanded? The association receives tens of thousands of kinds of batching items and raw material and, in order to inspect a large part of them, it would be necessary to inflate the control staff, enlist various kinds of specialists, and acquire a great deal of additional equipment (it would be necessary to conduct chemical analysis of alloys, to check the electronic and hydraulic devices, and so forth). And imagine double control--intake and output--at each enterprise! And then it still certainly does not guarantee improvement of the quality of deliveries.

I do not think there is any need to expand the OTK staff this much. The main thing is to provide for reliability of output control. And this requires conditions which will make it possible to increase the qualifications of the control staff (our attempts to change the situation with the adjustments in incentives and labor organization which are available to us are only a half-measure) and to take the OTK out of departmental jurisdiction. The technical control division should stand guard of the interests of the consumer, and this

means that it should not depend on the enterprise whose products it is monitoring.

The question of who should have jurisdiction over the OTK has been the subject of animated discussion in the press and experiments are being conducted. This opinion, for example, is expressed: place the chiefs of the OTK directly under the jurisdiction of the Gosstandart or the inspections teams for quality in the ministries. But then the entire OTK staff should remain on the roster of the enterprise since it is included in its structure and technology.¹ In my opinion, half-measures are not effective enough and the dual jurisdiction of the OTK could lead to conflicting situations. It is necessary to take the entire OTK staff out of plant jurisdiction. I am convinced that this will produce a positive effect: I observed a similar process when in our association we decided to take the controllers and the control foremen out from the jurisdiction of the shop administration and to reduce the OTK to one service. Now the nuances of intrashop interests and relations have less of an effect on quality control.

I do not think that the technology or structure of the enterprise will suffer if the OTK is taken out of departmental jurisdiction. The experience in preventive work accumulated by the OTK can be used by the other divisions and shop specialists (moreover this same prevention of defective work which is now being handled by the control foremen in the shops frequently leads to duplication or to a logical development of the duties of the production foremen, and the shift and section chiefs).

And the system of quality control in the association has long been in need of another manager--a new service headed by the deputy director for quality. In the association there is no consensus of opinion about the status of this service. But it is already being generated; cropping out from the division of technical control is a bureau of quality control (BUK). And as long as the "youngster is learning to walk" as long as its rights and functions are still being determined, the OTK remains "at the control board."

FOOTNOTE

1. "Who Should Have Jurisdiction Over Controllers?" SOTSIALISTICHESKAYA INDUSTRIYA, 21 March 1984.

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DEVELOPMENT OF ASUP ROLE DISCUSSED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 2, Feb 85 pp 39-45

[Article by N. I. Predkin, candidate of technical sciences, chief of the ASU division: "The ASUP: To Control or Inform?"]

[Text] If one were to figuratively imagine the role and significance of the ASU [automated control system] at the Plant imeni Kalinin, it would probably be most fitting to compare it with a young branch grafted onto an old tree. The very name of ASU is associated with the idea of modernization of the control system, which far from every enterprise will accept, the more so one of such a venerable age.

The first electronic computer appeared here in 1978 in the last stage of reconstruction. Of all the multitude of new equipment acquired during the reconstruction, the electronic computer was perhaps of special significance and demonstrated the readiness of the enterprise managers for a qualitative leap in its development. The introduction of an automated system for control of production [ASUP] begins simultaneously with the changeover to the output of automated complexes--and this again was not a random coincidence, but another piece of evidence that at the Plant imeni Kalinin they were striving for harmonious development which was to have been provided by the art of production, and they thought that the modern style of management should correspond to the modern products.

The "new branch" took hold, the "newcomer" ASU workers fit right into the collective with its existing traditions. The ASUP became a necessary part of the overall system of management of the enterprise and it helps to increase the effectiveness and improve the quality of the labor of the engineering and technical personnel. We cannot say that we survived without any effort, but on the whole the experience can be considered successful. With the introduction of the ASUP we took a course not toward "push-button" momentary replacement of the existing structure, but toward gradual formation of a unified mechanism for automated control which would efficiently combine both the new elements and the traditional ones which had been tested in practice. For example, a policy of machine set planning and accounting took form in the association. Within the framework of the ASUP this form was retained for unique and single-unit items, base parts, and planning and accounting

according to the products list was introduced for standardized parts and parts with extensive applicability. This makes it possible to develop and expand the possibilities of maneuvering and specialization, and to improve the rhythm and uniformity of the loading of the equipment.

In creating the ASUP we took advantage of the experience in organizing automated systems at many enterprises (particularly the ASU SIGMA which, in our opinion, was the most effective). But the software for the functional tasks and subsystems is basically original and takes into account the specific features of our association.

Now within the framework of the ASUP we solve about 120 problems related to technical preparation of production, technical and economic planning, operational control of basic production, bookkeeping and statistical accountability, accounting for personnel movement, the comprehensive system of quality control of products, and so forth.

The range of tasks is constantly increasing, which is dictated both by the development of the system itself (when solving new problems it becomes necessary and expedient to carry out further associated developments) and by the growing demands for information from the shops and divisions.

Thus when forming the plan for the OASU for 1984 the number of orders was almost twice as great as our capabilities. Of course, this situation forces the division to work extremely hard--we are striving to satisfy the orders as efficiently and as fully as possible. But this also gratifies us: increased demands for information from the electronic computers is a kind of indicator of confidence. And after all at first certain specialists of the association, pencil in hand, checked the machine printouts. Others required only "halfway" information, which they intended to use subsequently for independent calculations, and these were the kind which could easily be performed on a computer. Not only the large amount of explanatory work which was conducted by the OASU, but also the resolute support of the managers of the enterprise and the high professional training and art of thinking of the majority of managers of the user subdivisions help to overcome the psychological barrier.

In the association was formed a collective of skilled specialists in ASUP who did not reject any work, even that which was not very customary for them. We do not make any clear-cut distinction between those who formulate the program and the programmers; we discuss and solve all the problems that arise collectively. Expansion of contacts with various user subdivisions in all stages of the development has led to a situation where the majority of creative workers, especially mathematician-programmers, have begun to be fairly well oriented in questions of planning, accounting and organization of production. Obviously, this has played a decisive role in the establishment and "self-approval" of the division, and experienced production workers have come to believe in our competence.

The division, by teaching itself, contributed to imposing order and simplifying the information ties among many subdivisions of the enterprise (this was manifested especially clearly when it was necessary to carry out joint work on adjoining tasks). Thus there was an atmosphere in which it was

quite natural for the specialists of the association to be psychologically ready for contacts with the computer, and replacing clearly outdated methods of control which were based on incomplete and sometimes even subjective information.

Logically continuing this tactic, we arrived at the need to revise and modernize document circulation. We managed to considerably reduce the number of documents--some of them were eliminated and comprehensive documents were introduced for associated services. The majority of documents (for example, the "report on released parts," the "report on loading of equipment," the "report on the fulfillment of the plan in volume indicators," the "fulfillment of output norms" and so forth) were unified, the need for manual calculation was eliminated and the possibility of "approximate" and subjective information was also eliminated. Standards were developed and introduced for the enterprise for the preparation and movement of normative and operational documents under the conditions of the functioning of the ASUP.

In recent years the division has begun to satisfy the demands for nonstandard one-time and periodic calculations of an engineering and economic nature. The users did not wish to understand that the computer is not an adding machine, that it is necessary to develop new programs for it--they need the results today or tomorrow or at a maximum in 3-5 days. Trying not to abandon the principle we expressed "the computer can do everything," we literally bent over backwards, created original programs in short periods of time and used combinations of blocks of these programs, with which we solved functional problems, adjusting them to the nature of the demand. But the increased number of such orders (from dozens to several hundred a month) forced us to search for new forms. We were forced to refrain from developing original functional computer programs for each new kind of demand and began to create a complex of blocks that could be adjusted for a concrete structure of data and nature of the demand. The block programs, as one can see from the names ("selection," "fictional item," "batching," "sorting," "calculation of functions" and so forth), were formed on the basis of the most frequently encountered components of program software and made it possible to expand the possibilities of operational work in the OASU.

We consider "fictional items" to be the basic and most effective block. It made it possible to form the initial areas of information in the given structure (for example, in design specifications) and include in it an arbitrary set of any design elements--parts, assembly units and items produced by the association. For example, inclusion in the "fictional item" of items of the program of the month, quarter or year in the corresponding quantities makes it possible, by using only the programs of technical preparation of production, to calculate the products list plan of the shops and the labor-intensiveness of the program in norm-hours, rubles and normative net output, the demand for materials for the consolidated and specific products list, the planned load on equipment, and so forth.

Obviously, what has been enumerated can be realized within the framework of one of the systems for control of data bases (SUBD), but because of the universality and global nature of the banks, so far their assimilation and utilization involves a great deal of labor-intensiveness and does not always

lead to success, especially with a large normative base and large volumes of operational information. Therefore we are creating elements and blocks of our own bank which are significantly segmented as compared to the SUBD, but are adapted to the specific features of the plant. Of course, the possibilities of the plant bank are limited, but it is precisely this limitation that makes it possible to solve many problems more efficiently and with reduced expenditures.

Not everything went smoothly for us, there were also difficulties, mistakes and blunders, and there still are. Specialists in ASU find it difficult to become accustomed to the rigidity of plant conditions which do not provide any possibilities of running in new problems. We have not always met the schedule and in operations there are still nonsystematic, local calculation problems of a bookkeeping nature--previously they were solved on computing punch card equipment, and now they have been changed over to electronic computers. The desire to work efficiently has sometimes led to the creation of bulky nontechnological programs, additional expenditures of machine time, duplications of program modules, surpluses or shortages of information in individual documents, and inefficiency of certain forms of printouts. Certain problems, conditioned by production trivia, are "forgotten" or are not claimed by the clients. (Incidentally, such situations can hardly be categorically included among failures of the ASUP--they provide rich material for analysis of information needs and help to plan our activity with greater substantiation and consistency).

Many difficulties also arise in connection with the SAPR. We regard it not only as a system with a concrete special purpose, but also as a lower subsystem of the ASUP which forms normative information. Work for introducing the system is being conducted in two areas: in the design of items and in technological planning. It is especially difficult to formalize the process of design in which a considerable role is played by the intuitive creative basis. Mathematicians need the help of designers, but so far many of them, especially the experienced ones, are cautious about innovations from related spheres of activity and do not have much faith in the idea that computer equipment is capable of helping to create new machines. The work for creating the SAPR TP (in technological planning) is proceeding much more successfully. Specialists of the divisions of the head technologist and head metallurgist, and the design-technological division for standardization believe more in the idea of the SAPR. We are now working with them to assimilate a package of applied programs (for the development of technological processes for billet and mechanical processing work, searching for analogue parts, norming basic operations of mechanical processing), we are creating classifiers and we are searching for methods of normative cutting of rolled metal, normed painting and galvanizing work, and calculation of instruments.

And so what specifically are the electronic computer equipment and economic-mathematical models doing for the association now?

During the time of the functioning of the ASUP its direct economic effect (with all of its shortcomings and the imperfection of the methods of its calculation) has exceeded 1.2 million rubles. Also fairly large is the indirect effect which is frequently not subject to quantitative evaluation.

For example, the calculation of the need for purchased batching items usually lasted several months--and still there were mistakes, and many items were simply mechanically transferred from the orders from the year before. This led to a piling up in the warehouses of a multitude of unnecessary purchased items and to a freezing of funds and above-normative supplies--and at the same time there was a critical shortage of other items that had not been ordered. The use of electronic computers makes it possible to draw up orders more efficiently and better, and it practically precludes mistakes.

When developing the technical and industrial financial plan, in the section entitled "Deciphering Material Expenditures" the computer revealed only one mistake--the wrong blank had been ordered (there was already an agreement for the cooperative delivery of 104 units worth a sum of 329,000 rubles). The delivery of the unnecessary blanks and the lack of the necessary ones would have led to large losses.

But how does one evaluate the economic effectiveness of labor-intensive work for statistical accountability of a public health point? Along with this one analyzes the load on the doctors, the reasons for the injuries and diseases and their dependency on the age, the time of year and the kind of occupational employment. Because of this work the time of the physicians is being utilized more efficiently and problems of improving production and sanitary conditions are considered and solved expediently.

Now one can say with confidence that the computer has become an irreplaceable assistant in the sphere of preparing operational and objective information for management, and in the association no one any longer doubts the expediency of our system or its right to exist. But concern for the overall low effectiveness of the ASUP has begun to be expressed more and more frequently in the press (it is curious that here nobody calculates the effectiveness of the PEO, PDO, OTiZ, the bookkeeping office and other traditional subdivisions whose activity is now simply unthinkable without the ASUP--at least in large enterprises!).

I think that the skepticism was brought about by the abundance of ASUP's which were operating at a loss, were not developing and were not adapting, which were not able to satisfy the information demands of the users and discredited the project as a whole. Apparently there is no point in trying to have an ASUP at each plant; frequently it is more reasonable to organize centers for collective use for several enterprises. At the same time it is necessary to contribute in all ways--both morally and materially--to the development of effectively functioning systems.

One should probably not overestimate the possibilities of the ASUP either. Up to this point many see in a global organ, capable of solving all problems of administration. As before, people will be controlling production and the enterprise (at least in the foreseeable future), and the ASUP is to put in information at their disposal. Thus is it not more reasonable to speak not about an automated system for control, but an automated information and advising system?

Possibly, our approach is not unquestionable and it is not acceptable for everyone, but it enables our ASUP to develop along with the enterprise, to provide for its economic effectiveness and maximum satisfaction of the information needs, and it contributes to advancing the art of production.

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FLEXIBLE AUTOMATED PRODUCTION DESCRIBED

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[Article by V. V. Karzhan, director of the All-Union Experimental Scientific Research Institute of Forge and Press Machine Building [ENIKMASH], candidate of technical sciences (Voronezh): "To GAP--Through NPO?"

[Text] I will not reveal anything new if I say that interested cooperation between scientists and production workers enriches both. The cooperation of the ENIKMASH with the Plant imeni Kalinin has helped to clarify the prospects for further development of the entire subbranch. The conclusions from the joint work of the institute in the plant, which has become one of the leaders in the subbranch, lay at the basis of the concept of the development of forge and press machine building which was developed by the ENIKMASH in 1984.

Having analyzed the basic tendencies, the specialists came to the conclusion that major attention should now be devoted to accelerated changeover to technologies involving fewer people. The institute has already begun stage-by-stage creation of flexible automated production (GAP). We are relying on the brief but extensive experience in comprehensive automation and robotization of forge and stamp production. Only 80 years have passed since the ENIKMASH, in conjunction with the production association imeni Kalinin, created an experimental model of the first industrial robot in the subbranch, the PRTs-1, "which worked as a stamp operator" for the 100-ton press, and already we can speak about large-scale robotization. More than half of the robots and manipulators produced in the country during 1981-1983 are being used in forge-stamp production.

A Robot Is Not a Luxury

The article by the general director of the PO imeni Kalinin discusses how difficult it was to begin the production of robotized complexes. Unfortunately, even now not everyone understands that rapid robotization is not a fad, but a necessity. Attempts to deepen the automation of many technological processes using other, more traditional means have led to the creation of cumbersome designs with a long time period for recouping expenditures. Robot equipment is becoming a more efficient and functional means of automation, and without it it is impossible to solve a whole number

of problems that arise in forge and stamp production, and without it further intensification is also unthinkable.

In this production there is a large proportion of monotonous and heavy physical labor whose content does not meet the demands of the modern educated worker. Labor turnover increases and the shortage of personnel is being experienced more and more sharply in almost occupations, especially among forge and stamp operators. I think that one could even speak about an incipient "dying out" of these occupations.

And this is one of the most important reasons for the unsatisfactory utilization of forge and press equipment. The presses and our other equipment is increasingly being considered to be in short supply, but there are no permanent workers for a large number of machines, and they stand idle.

The institutes and design bureaus of the enterprises of the subbranch are developing and producing more and more productive equipment, but the reserves are not being utilized. The quantitative growth of the volumes of processed materials is not significantly greater than the growth of the stock of equipment.

The worker is not successful at a modern rapid machine (analysis shows that in a machine-building enterprise with manual servicing the coefficient of the utilization of the number of runs of forge and press machines is very low: it amounts to 0.10-0.15 for presses with small forces and 0.20-0.30 for the rest of the equipment).

Specialists may object that today's robots are not mobile enough. Indeed, when stamping small (up to 0.5 kilograms) parts the robot sometimes cannot gather the speed that a human can. A worker stamps a part in 4.5-4 seconds, and the time of the cycle of the PR (industrial robot) is from 10 to 8 seconds. But even with this speed the robot will win out in just a few short time segments, and in a week or a month it will produce more products. For it works uniformly, without declines, and it does not need breaks for dinner and it has no problem with shift work. Moreover the possibilities of intensification of physical labor of the human must be limited. But reducing the cycle of the robot is a quite solvable technical problem. New possibilities have been suggested by the idea of assigning one robot to two or three presses. (The experimental model of such a complex, created by the ENIKMASH in conjunction with the Plant imeni Kalinin, was demonstrated at the International Exhibition EMO-5 in Paris, and the idea was given a high evaluation by visitors to the exhibition.) In conjunction with designers and production workers we are also thinking of this variant: to place the robots at two or three presses of different types and to create robotized sections with a closed cycle for producing particular objects.

Taking into account today's experience, one can say with confidence that the first GAP's will appear in sheet and stamp production--comprehensive automation and robotization are assimilated most easily here, especially during the process of cold stamping of rolled sheet metal. It is predisposed toward this because of the high degree of specialization and the breaking down of the technological process into simple, brief operations. It is possible to

change over to GAP in sheet and stamp production by using even those simplest cyclical, rigidly programmed robots of the first generation which are today supplied to automated complexes by the Production Association imeni Kalinin and other enterprises of the subbranch.

Module complexes are especially promising and logically close to the idea of the GAP. In the near future we shall change over to the aggregate-module principle of producing robots. The consumer will be offered a large selection of modules with which he will be able to create the necessary aggregates and complexes and adjust them for various operations.

In sheet stamping production even now it is possible to extensively introduce adjusted robotized technological lines (RTL) which can be called prototypes of the GAP. In the RTL the cycle for processing parts and the process of installing and removing semimanufactured products and prepared parts from technological equipment are automated. Series-produced robotized technological complexes, sections and transfer devices for transporting semimanufactured products to the equipment can be used as modules.

The Association imeni Kalinin has begun to produce adjusted RTL's and as early as 1984 will deliver to the consumers experimental models of three- and four-operation lines which were manufactured in conjunction with the ENIKMASH. In the next 2-3 years the Kalinin workers intend to change over completely to the module-aggregate method of producing robot equipment for sheet and stamp production, and in the future five-year plan this method will also be assimilated by other enterprises of the subbranch.

Will the GAP's Be Reliable?

In addition to searching for new methods of automation, the work related to providing reliability of the GAP is also of great importance. The rates of introduction of the GAP's and the effectiveness of their utilization in industry depend on the solution to this problem.

The complexity of the GAP as compared to the universal nonautomated equipment increases more than geometrically. With increased complexity the reliability can decrease. For example, if any automated sheet and stamp complex intended for completing a GAP now has an output before breakdown (time of operation between breakdowns) of 20 hours and the average time for eliminating the causes of the breakdown is 30 minutes, these time losses amount to 2.5 percent. A GAP which includes 10 units of strictly related basic and auxiliary equipment of the same level of reliability will have an output before breakdown of only 2 hours, and the time losses will amount to 25 percent.

Calculations show that in order to provide for continuous operation of the GAP for two to three shifts, the reliability of the basic equipment must be increased five-eightfold, and the reliability of the electrical, pneumatic and hydraulic fittings, which are components of the systems for control of the equipment and the GAP--eight-twelfold.

Is this task feasible? Completely. For the machine breaks down, as a rule, because of the unreliability of a limited number of elements. And it is necessary primarily to reveal the most vulnerable parts of each machine. Increased significance is attached to that feedback from the consumers of forge and stamping equipment which, perhaps, the Association imeni Kalinin tries to organize in the most planned way. This work is also being conducted more or less consistently by other enterprises of the subbranch. But still the information coming in from the consumers is not yet systematic or voluminous enough, and it cannot be used as a basis for comparing the entire idea which is necessary for developing a branch comprehensive program for increasing the reliability of machines under the 12th Five-Year Plan. Because of this specialists in the sector for reliability and testing of the ENIKMASH have developed the draft of the Gosstandart, "the policy for accounting for data concerning breakdowns, downtime and repair of equipment in the hands of the consumers."

Having prepared the first edition of the GOST, we sent out materials for responses from 180 enterprises. It is typical that only three enterprises sent negative responses, and the rest of them think that it is necessary to introduce mandatory accounting. Obviously, even in this one can see the psychological readiness for the large amount of work which must be conducted by the head institute and enterprises of the subbranch in conjunction with the enterprises that consumer our equipment. The new GOST will go into effect at the end of 1985.

But of course it would be naive to hope that the GOST will help us to solve on the spot all problems related to ensuring reliability and effectiveness of the GAP. It is necessary to have another entire complex of technical research (for example, associated with the creation of diagnostic instruments that correspond to the level of the GAP); and it is necessary to achieve an improvement in the quality of batching items. To do this it will obviously be necessary to do some kind of restructuring of relations between the manufacturing enterprises and the clients and to search for an optimal variant of the functioning and the hierarchy of services of technical control (which is discussed, in particular, in the article by the chief of the OTK of the Production Association imeni Kalinin, K. V. Sudilovskiy).

Further deepening of the work on the GAP will require solving another whole series of organizational problems which directly ensue from the more complicated technical problems and from the experience in cooperation between the head institute and enterprises of the subbranch.

Unification, Centralization and Concentration

Expansion of the institute's cooperation with enterprises of the subbranch and their mutual striving for a joint solution to crucial problems have played a large role in the initial stage of comprehensive automation. The example of the production association imeni Kalinin, the first in the subbranch to begin producing robotized equipment, has been especially significant. Its undertakings have helped others to overcome the fear of robots. This stage was necessary, just as it is necessary for anything to have a beginning.

But now we can hardly be satisfied any more with the way the production of robot equipment is broken up into small units. It is produced by eight enterprises of the VPO Soyuzkuzmash and 10 enterprises of other machine-building departments. No less than two-thirds of all the robots are produced at nonspecialized enterprises of various ministries. Not to mention the fact that this robot equipment is manufactured under primitive conditions and therefore costs a great deal (the cost of the means of mechanization reaches 70 percent of the value of the entire complex and more), and great difficulties arise with the operation and repair of this equipment. For each enterprise strives to create its own "firm" planned repair, and the diversity of type is too great. And the art of their production and the reliability are frequently not very high.

Today we already need unification of robot equipment and specialization in its planning and production. It is intended to construct a plant for producing robot equipment; the Voronezh State Planning and Technological Institute of Forge and Press Machine Building (GPTIKuzMASH) has begun to plan it. Obviously, even before this enterprise goes into operation the Khmel'nitsy Plant for Forge and Press Equipment will specialize in the production of robot equipment in the subbranch. The development of the designs will be handled by the Tanganrog Institute of GPTIKuzrobot, and ENIKMASH will provide methodological guidance of robotization, linking it to the development of the GAP.

The changeover to intensive and purposive work on the creation of the GAP requires the strengthening of ties between science and production. In my opinion, such a large and integrated product as the GAP can and should be produced in firms where the entire process, from planning to manufacture, if not broken up by departmental barriers, but is carried out under the leadership of a unified scientific and technical staff. The scientific production association could be such a firm.

In Voronezh there are possibilities of organizing an NPO [scientific production association]. In this city the largest center for forge and press machine building in the country and in Europe was created in a natural way. In addition to ENIKMASH, other scientific research and planning and design institutions are located here: GPTIKuzMASH, which is responsible for technology and improvement of the production of forge and press machines, and a special design bureau for forge and press equipment and automated lines (SKB KM). There is also a large production base here which is represented by two intensively developing leading associations of the subbranch--the PO imeni Kalinin and the PO for producing heavy mechanical presses. Two one degree or another all these collectives should participate in the creation of the GAP. But the work will hardly be fruitful if we retain the previous forms of cooperation. Up to this point it has been based either on initiative, good relations and neighborly mutual advantage, or it has been regulated by higher levels. That is, either it has been in principle unreliable and has depended on coincidence, moods, operational production situations and so forth, or it has been complicated by formalities which have significantly prolonged the period of work.

The experimental base of the ENIKMASH does not correspond to the status of a head institute of a subbranch, and we have fewer designers than the plant divisions do. Therefore difficulties arise in the first stages of much less global work than the GAP. Sometimes things reach the absurd: next to us, under the same roof, are working skilled designers of the special design bureau, who are in such short supply in the ENIKMASH, but we cannot enlist them for work on the plan since they are under the direct jurisdiction of the VPO.

Since all of our neighbors still have their own plans, which diverge from the plans of the head institute of the subbranch, they can certainly not always facilitate the developments of the ENIKMASH and bring a promising idea to the stage of the experimental model. For instance, equipment from our experimental base makes it possible to manufacture only machines weighing up to 25 tons, but the subbranch produces presses which weigh more than a thousand tons. We must carry out developments which are for these machines as well, and then test them by building them into an automated technological chain. The question of where and how to do this has not been solved yet. It is difficult to imagine further, ever more complicated work on the creation of a GAP under such conditions.

The creation of a scientific production association would make it possible to avoid duplication, which our organizations and enterprises are still unable to avoid, and to facilitate and accelerate the unification of related developments.

Specialists who do not believe in the expediency or possibility of creating an NPO usually express this opinion: it will be impossible to merge into a unified whole all of these institutions and enterprises which are too large, each of which has its own traditions, its own particular style of problem-solving. Yes, of course, many problems are arising--personnel problems, social problems and economic problems. Obviously certain refinements and changes in specialization will be necessary. It is difficult for each collective to give up its own customary way of life and its own independence. But is it really necessary to bring all these structures together by force? After all, even within the framework of the NPO the collectives can still fully retain their individuality when solving local problems.

Of course, the creation of an NPO still does not guarantee success. In working on the creation of a GAP it is necessary to have interested participation of representatives of those departments and enterprises which will be operating it. The production of warehouse facilities, the designing of fittings, the manufacture of individual kinds of stamps, and the training of personnel, should obviously remain for the time being within the jurisdiction of the client, but these problems cannot be solved separately from the planning of the GAP. This means it is necessary to have coauthorship and coordinated plans.

At first both the scope of the work and the mutual responsibility may seem staggering to many. But everyone, including the national economy, will benefit from the mutual coordination of plans and the concentration of forces for solving such a global economic and technical problem as the GAP.

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PREPARATIONS MADE FOR GAP

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 2, Feb 85 pp 54-57

[Article by I. F. Brykin, chief of the design and technological bureau of the Voronezh Elektrosignal Production Association: "We Are Preparing To Receive the GAP"]

[Text] Our association produces Rekord television sets which are in constant demand. The majority of parts for them are now being manufactured by methods of precision casting and plastic deformation as well as stamping. The Production Association imeni Kalinin produces 14 percent of our stamping equipment. For the seventh year now four robotized stamping complexes manufactured by the Kalinin workers have been in operation in television production. The economic effect from their introduction was 29,000 rubles.

We are frequently asked: How do we explain the fact that our enterprise robotized equipment is utilized successfully while at many other plants it is ineffective and frequently breaks down. Perhaps we were simply lucky and were given unusually good products?

Elektrosignal received not the "highest quality," but experimental models which were created for sheet stamping production. They were not forced upon us, and from the very beginning the robot equipment was not an alien element in our production. Robotization became a necessary stage in the development of technology.

When, in keeping with modern tendencies, we tried to sharply increase labor productivity and television production and bring it close to being waste-free by increasing the volume of stamping work, we encountered precisely the same social problems which were discussed in the article by the director of ENIKMASH, V. V. Karzhan. We felt that if in the near future we did not succeed in putting a halt to the increasing labor turnover among the stamp operators, all of the technical and economic advantages we had achieved would be nullified. There would be nobody to work at the presses. We tried to reduce the shortage of personnel by offering the stamp operators benefits and the dormitory and took advantage of other measures of a similar compensatory nature. But this did not help, and many women, when they became familiar with the sheet stamping shop, asked to be transferred to other work.

Having been convinced that measures that do not change the nature of the work are not very useful, we begin to think about means of automation. We decided to begin with the most labor-intensive section, in which we manufacture chassis for black-and-white television sets. We happened to learn that ENIKMASH was completing work on an experimental model of the first industrial robot for sheet-stamping production. It was clear that there was no point in taking just one robot: for this could not eliminate even one worker. So we concluded in agreement with ENIKMASH which stipulated the manufacture of four industrial robots and auxiliary technological equipment. Thus we planned to put four robot technological sections into operation all at the same time so as to release all six stamp operators from heavy labor.

The agreement with ENIKMASH included this condition: to disclose as clearly as possible the main "weaknesses" of the industrial robots while they were still at the institute. We sent two presses and instrument fittings there. The first tests of the robot technological complexes lasted for 2 months. We delivered blanks to them and joked that the institute could help us fulfill our production plan.

Having been convinced that the RTU would work, we installed it in our shop (but we decided to leave the old mechanized line for the time being: and suddenly...incidentally, it was no longer needed). The stamp operators were transferred to another section and were given easier work--bending the brackets on the corners of the television sets; and their wages remained the same. ENIKMASH helped us to train the first operators. All this work was done very rapidly, actually in a month and a half--and on 8 February 1978 the new section produced its first product.

But for several months more, in conjunction with the planners and manufacturers, we adjusted and perfected the RTU "on the move." Operators were given the duty of keeping daily accounts of breakdowns and maladjustments. At first the breaks were unreliable--it was necessary to use a hydraulic system instead of the pneumohydraulic one. Another thing that did not work in production was the generally good device for taking the parts from under the stamp and subsequently sorting them in individual cassettes. At our suggestion the ENIKMASH manufactured a slab with grooves to go under the stamp, which replaced the device which was not very reliable. One can give many examples in which we worked together to find technical solutions which made it possible to increase the efficiency factor of the robot equipment. Of course, the success in the joint work was brought about to no small degree by the fact that the Production Association imeni Kalinin and the institute are our neighbors.

When the products list for the new section was being selected it became clear that it would not be effective to use the traditional system for manufacturing parts on a one-position stamp here since it was impossible to sharply increase the productivity. "But here would it not be possible to use one robot for two presses?"--We asked this question of scientists of ENIKMASH. We began a new stage in creative developments which we have conducted in parallel. ENIKMASH's specialists have created and, in conjunction with the Kalinin workers, manufactured this same three-handed robot which has been exhibited at

the international exhibition and which can operate two presses. Specialists of our association were the first in the branch to plan and manufacture stamps for simultaneous manufacture of two screens. Designers of technical equipment, at our suggestion, changed the configuration of the screens, which made it possible to reduce the number of operations for their manufacture—we make do with two instead of three. And for the third year now this robot technological section has been functioning successfully in the sheet stamping shop. By analogy with this innovation we are also assimilating a technological process for simultaneous manufacture of two brackets.

But the experimental model of the three-armed robot, which the consumers urged the scientists to create and which marked a new stage in the robotization of the sheet-stamping production, is being turned over to us. This year in the sheet-stamping shop there will be another complex, the most effective one so far, and the process of manufacturing screens for color television sets will be automated.

All that has been discussed above is only the first stage in the automation of television production, and the second one is beginning today. Because of our experience in successful utilization of robotized complexes, Elektrosignal will be the base enterprise for the creation and introduction of the head draft of the GAP for cold sheet stamping. Included in the work on the head plan, in addition to specialists from our association and ENIKMASH, are scientists and designers from Leningrad, Gorkiy and other cities. Not only the Association imeni Kalinin, but also other enterprises of the subbranch of forge and press machine building will produce units of the GAP for us.

Along with the ENIKMASH and the Production Association imeni Kalinin, we shall continue work on improving automated complexes which will become the primary, base units of the GAP. The robot equipment in which we have all invested so much effort has become reliable. Paradoxical as it may sound, today the robots are even more reliable than the presses are. But this certainly does not mean that the traditional equipment produced by the Kalinin workers does not satisfy us—we like its high durability and the precision of the design of the 100-ton press, its relatively great technological capabilities, its rapid movement and the simplicity of its adjustment. The Kalinin 100-ton press can be included in the automated complex more easily than any other kind of press. But press equipment is not developing as intensively as robot equipment is. For automated complexes we need presses that are more compact and have a more reliable design; we should also like for them not to be so noisy. We submitted our remarks and suggestions to the designers of ENIKMASH and the Production Association imeni Kalinin, and we hope that they will help to make the GAP a modern technological ensemble.

Light and spacious premises are being constructed for the automated television production. In the new shop there will be no stamping machines at all. But this still does not mean production that does not involve people: instead of the current 110 basic workers, about 40 operators and welders will be employed there. It is planned to introduce the GAP in 1985-1986. The presumed annual economic effect for the introduction will be 400,000 rubles.

Here is concrete, tangible evidence of the fruitfulness of such interrelations between consumers and manufacturers, scientists and production workers, that arise when they do not hide behind departmental boundaries but boldly meet one another, when the introduction becomes the common cause. This kind of cooperation has made it possible to make the innovation both viable and effective, and it has opened up the way for the development of production and the achievements of scientific and technical progress.

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PLANT RECONSTRUCTION FANTASY RELATED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 2, Feb 85 pp 58-74

[Article by Nina Maksimova, journalist: "Fantasize!"]

[Text] How Beautiful Roses Are

About 15 years ago a young, innovative director came to an old plant which in the past had been the winner in all competitions, but when it was about to be reconstructed it had even stopped fulfilling the plan.

Here is how people recall this. "He began with cleaning up the garbage and planting roses. This is what was unusual. Usually people do not come to the plant in order to plant roses."

The rose bushes, to which we devoted costly man-hours during a time of failure, produced a sensation. More was said about them than was said about the products list. After the roses it was difficult to be surprised about anything and the appeal "Think, Dare, Fantasize! Do Not Be Embarrassed To Express Your Most Ridiculous Ideas--This Is Necessary"--sounded quite natural.

The director was calling upon us to use fantasy when solving problems of reconstruction and development of the plant. Not only competent specialists were being enlisted in this, but creative groups were being created which combined competent specialists with "dilettantes" (that is, specialists who are experts on any problems except the ones that are being solved). Could the competent people calmly listen to the ideas of the dilettantes?! That which could be calmly resolved under the working policy was resolved in arguments, and it became an excessive load (the director tried but was unable to free the creative workers of current affairs and also gave justification for the self-ironic title--"Health Group"). In the actions of the group there was no regularity, no planning and no permanence of any kind. They met sometimes every other month, sometimes every year ("as the problems became crucial or as they sensed a need for them")--and each time there were new participants ("in order not to allow stagnation in thinking"). And the director forced everyone to revolve around the cataclysm: the economists prepared calculations for the groups, the shop chiefs were invited to criticize the ideas for the

development of their subdivisions, the foremen and workers acted as consultants on local problems.

A kind of equilibrium came into being. The word "fantasizer" lost the slightly derisive connotation which was usually given to it by experienced production workers. So many ideas appeared at the plant that they became crowded even in the unlimited "health groups." The director was in the center and kept up with things. With him, they say, it was easy to think with two, with three or with five. During duty hours, in the evenings, and on days off...sometimes after these intellectual tournaments director's orders appeared which clearly outlined a sober production task that had ensued from a fantasy, and the "person responsible for its execution" laughed at himself: "I fantasized it in my head"--but he did not become more cautious.

This is how the closed sections for specific objects were created in the assembly and mechanics shops, those innovations which the Kalinin workers are now showing to people on excursions; this is how they program the development of the Novokhovorsk Plant for Press Components and the shop for consumer goods which, oriented toward consumer demand, is already able to rapidly assimilate new products; this is how they introduced machine tools with numerical program control and planned the output of robotized complexes. Thus the basis was laid for long-term prognostication. In 1974 they tried to determine which machines and what quantity of them would be produced by the plant before 1995. They looked into the future of other enterprises as well. The Kalinin workers were interested in whether or not they would appear at the juncture between specialties, which would enable them to exchange products with other enterprises and concentrate their products list. For example, would it not be possible to transfer all hammers to the Astrakhan Plant which now produces only small hammers? (Specialists of the Plant imeni Kalinin clearly "went beyond the framework" and tried to predict the development of the subbranch....)

Five years ago Nikolay Ivanovich Yendovitskiy left Voronezh. Now he is the chief of the production administration of the Ministry of the Machine Tool and Tool-Building Industry. But the "health groups" continue to operate in the association. I was not fortunate: during the time of my temporary duty there a group was not convened even once. Of course I believed the stories, but I wanted to be convinced of their effectiveness for myself. And suddenly I was able to.

I was interested in the problem discussed by the leader of the group for the reliability of equipment that is produced. Feedback from consumer enterprises was becoming weaker and it was becoming more and more difficult to obtain information about how the Kalinin machines behaved in operation. And without information the designers would be working blindfolded. "What do you intend to do?" The leader, who at one time enthusiastically constructed practically the first "information bridge" in the subbranch answered with fatigue: "I cannot think of anything more to do; this is a difficult problem for all enterprises; so let the higher authorities think of something."

In the sector for reliability at the head institute I found out that a draft of a new GOST was being prepared which made it incumbent on the workers to

account for breakdowns. But the specialists of the institute think that the new GOST will improve things only partially.

Here I recalled the "health groups" and began to "toss out" this question to specialists of higher and lower levels, who did and did not have a direct relation to the problem. The mechanism went into effect quickly. The problem was completely fantasized and turned upside down. The difficulties with the information illogically caused the head engineer to fantasize about the time when the association would produce not "more and more," but fewer machines, but it would help the consumers to repair them and keep them in good condition. "And then we ourselves will have the information which we are asking for now." The chief of one of the sections was surprised as a dilettante that in order to gather information about breakdowns they had invented (and included in the draft of the new GOST) some kind of journals of observations, and he explained that it could be obtained more precisely and easily from the orders for repair. ("And if the basis of these orders were fed into a computer it would be possible to come up with a general analysis.") It turned out that the orders are usually stored for about 2 years but so far nobody had thought about using these supplies of information.

"And I even thought about them when I saw the poorly filled-in journals," the leader of the group for reliability of equipment, to whom I returned at the end of the discussion, was disturbed, "but somehow I forgot about this idea. Perhaps because the orders are in the division of the head mechanic and our group is a part of the head designer's division.... It seems that at VAZ this is approximately the way they gain their information--and there it is much more complete."

His eyes lit up and his voice became stronger. He questioned the head engineer's idea: with our products list service from the manufacturer is impossible. Let us calculate how many machines we would have to repair.... He began to count, started to doubt, dug into the papers and began to think, without even noticing that he was going far beyond the boundaries of his own department.

There are probably simpler ways of bringing the plant to fulfillment of the plan and even to victories in the socialist competition. Without turning the problem upside down and without wasting time on inspiration, which does not seem to be very appropriate in a rationalistic production environment.

The former general director of the PO imeni Kalinin, the chief of the production administration of the Ministry of the Machine Tool and Tool Building Industry, N. I. Yendovitskiy: "It would be unnatural if now I liked everything that I did then when I was a beginning director. Probably now I would do things differently. Perhaps even more.... And mainly...the plant is developing in the direction which was determined at the time of the reconstruction. This means that we were thinking correctly."

But for some reason, when recalling that decade when the plant was managed by N. I. Yendovitskiy, stubborn Kalinin workers are more willing to discuss not the serious production achievements which there always have been, but only the

be, but of those unusual fantasies which led to the achievements and which somehow embarrass people when they grow older.

And each spring the roses bloom around the shops. And long before the time when the morning stream of production workers passes by the bushes, the flowers covered with dew greet the new day.

Remain Yourself

Speaking about the past, present and future of the Kalinin workers, Anatoliy Grigor'yevich Krupenko nervously paced his office, sometimes approaching the wall on which the plant chart hangs.

From this chart and from appearances the plant is not especially great. The buildings are low and there are not many more than 5,000 workers. It is of average size. And at first I did not at all understand the Kalinin workers who had spoken about the scale and dimensions.

Krupenko noticed that my curiosity did not contain the proper amount of rapture.

"I shall take you to the consumer goods shop. I shall show you what we have done there and what we have not done even though we could have."

Near the old smelting furnace the director observed silently for a couple of minutes how an elderly worker was using a small spoon to pour the molten metal into the forms.

"The director of the neighboring plant saw this furnace recently. But why, he asked, do you torture people this way? But we produce large machines and are used to moving tons, so this work is not considered to be difficult. Considering the women stamp machine operators whom our robots are releasing at other plants, we thought and then looked at ourselves.... But soon there will be no hand-smelting. A 'health group' convened recently. This shop would have continued to exist for another 3 years with the old technical equipment, but they decided not to wait until it burst through the walls. And our neighbor prompted us...."

Krupenko showed me what other old sets of equipment and machine tools with manual control would disappear from the shop. The updating requires a basic restructuring of technology, large changes and reinstallation of the equipment.

"We will move through all the floors! We have already done this several times in this shop. And have you dropped into the shop where we intend to place the new machine tools from the Zhkoda firm? Have you seen what is being done there?!"

During the first days of my stay at the plant the chief of the division for scientific and technical propaganda took me to the place where he wanted to show me how they process heavy base parts,--and I almost backed out of the door: the shop gaped with a dusty emptiness, the wall had been broken down,

and there were no machine tools. "When did you manage to do this?"--he was confused by the mess which he was embarrassed to show a visitor. "Day before yesterday I dropped in and everything was in order."

No, the Kalinin workers will not refrain from an innovation if it fits into the premises, into the technological charts and into the traditional ideas. "Let us convene a 'health group' and...." Krupenko smiled, since he was proud of the scope and dimensions which I had already begun to feel. There is something childlike in this ability momentarily and dispassionately to overturn the order. How did this become possible at an old plant?

Krupenko doubted that an 85-year-old plant was old. It has no old walls. It has experienced many destructions, breakdowns, reconstructions and it has frequently had to change its course. A readiness for renewal has become a part of its character. "I think that there is also a succession," Krupenko added confidently. (I think: also the appeal "Dare, Fantasize!" would be understood by those prerevolutionary workers who gathered in the field during dinnertime in order to hear the speeches of the orators who had come.)

Anatoliy Grigor'yevich Krupenko has been director for several months, and during the time when Yendovitskiy was director he worked here as the head engineer. They were friends in the generally accepted meaning of this word, but it was to the head engineer that Yendovitskiy spoke most frequently: "Do you want to hear another one of my ideas?" And again a discussion broke out in which Yendovitskiy invariably played the role of a daring innovator, and Krupenko--was it not because he was a little bit older?--became the ironic opponent.

And now the opponent has been assigned the role of successor. This is not easy if only because many Kalinin workers now want to see in any director an exact copy of Yendovitskiy. But director Krupenko is slow and he weighs things in places where Yendovitskiy made decisions on the spot. His inclination toward complete communication and toward detailed consideration of problems sometimes keeps Krupenko from fitting into the rigid framework of business life. No, he is not very much the same, he is different--and although he himself is rapturous when he speaks about his brilliant predecessor and is confident that he must continue the main line, he still remains himself.

During our dialogues, which Krupenko and I would begin in the director's office and sometimes continue in the shops, I tried to sense the logic of this constant desire of the Kalinin workers for renewal. And it seemed that it was also interesting for Krupenko himself to look around, to sum things up and to rethink things.... We would begin to speak about robots especially frequently--and each time I would be impressed by this audacious outburst: from "mastodon"-presses to precision robot equipment.

Without saying anything Krupenko walked from his desk to the door of his office several times and I discussed my impressions from our visit to the section for robot equipment. I recalled the excitement with which the section chief said: "The robot is smart. The robot releases everyone from heavy labor. Especially women. For the stamp machine operators whom we are now

trying to release are all women. So you see the robot will return women to the family!" But it is too difficult to produce the "liberators." Because of the irregular deliveries the section has to make and process more and more parts through its own efforts, and it is being increasingly isolated and alienated from the plant. In a couple of years the entire enterprise will turn to specialization, and the shop--to universalization. It is restricted and held back by the conditions and capabilities of the plant. So far the plant does not need many robots, and therefore there are not many people in the section, but they must be able to do a great deal. The machine tool operators needed there must be capable of becoming universal machine operators, and the electricians must be able to learn to deal with electronics. Those who are not capable of this are not driven out; they simply cease to be noticed--this is perhaps a just, but very cruel natural selection. In order to test the prepared robots at the presses they must come down from the third floor, where the section is located, to the first floor, and the assembly welders along with the electrician-electronic specialists sometimes become loaders.... "In fact the section is moving forward outside the walls of the plant, and for you it is--you say so yourself--too troublesome an acquisition. This means that one could wish for enterprises specializing in the output of robot equipment to appear more quickly."

But still I am not surprised by Krupenko's answer (I am probably beginning to become accustomed to the logic of the Kalinin workers):

"You know, now I would not give up the robot equipment section. It is already ours. You, of course, drew attention to the fact that even though it is 'pushing out the wall' nonetheless it is the cleanest, lightest and most spacious section in the plant. We shall move it down from the third floor, expand the production of automated complexes and, perhaps, we shall construct a new shop.... Indeed, in order to create this production we had to jump over our own heads. Because of this it is difficult even now. But is it bad? Perhaps not all of them, but certain electricians have still managed to become electronic engineers! If when manufacturing an anvil block it is possible to err even by 2 millimeters, when manufacturing robot equipment our worker is accustomed to working with micrometers, it is necessary to keep track of the 'hundredths.' I am confident that majority of Kalinin workers are proud of the fact that robot equipment is made at the plant--and not just because they write about this in the newspapers. It seems to me that if we take away this section now we will forget how to think."

The chief of the production administration of the Ministry of the Machine Tool and Tool-Building Industry, N. I. Yendovitskiy:

"Yes, specialized plants will appear and they will produce series robot equipment. But at many enterprises (and at the Kalinin enterprise--absolutely!) they will begin to make their own robots. Can one really stop the designers from thinking?"

One can by no means forbid the Kalinin designers to do this. And therefore the chief of the design bureau of single-bracket presses from the division of the head designer, Boris Ivanovich Chagin, expresses his independent judgment of the issue in question:

"But in my opinion this specialization in the production of robot equipment in our subbranch is generally impossible. How can one or two plants produce robot equipment for the entire diversity of machines we produce? It is another matter to produce standard components and parts so that from them, as from a child's construction set, one can create various robots, and it will be easier to repair them."

Technologists turn pale when one pronounces the name of this designer in their presence. They think that one designer like Chagin, if he is not corrected, is capable of breaking down all of today's technology. In arguments Chagin will fight to the death and prefers to sustain blows rather than agreeing to adjustment if this will lead to a deterioration of the future machine.

Recently Chagin along with the designers from his bureau completed a plan for a robot which the subbranch does not yet have. It does not weigh much and takes up almost no space--it is built into the space between the stamps on a press. It can lift a billet weighing up to 8 kilograms and more and work at a speed of 25-30 moves per minute.

Chagin himself introduced the idea, using pictures in the exhibition magazine. He had thought for several months, not saying anything to anybody, when he was drawing other plans, in the evenings, while he was fishing, and while he was asleep. Having drawn up the blueprint, he went on vacation, and when he returned he erased everything: a simpler variant had "arrived." The subject had already been included in the plan. All the bureaus, including women with families, remained at work until 8 in the evening for a month and a half in order to complete the project on time.

Chagin took me to show me an experimental model. Outside there was a cold winter rain but Chagin did not hear it; he was discussing the unique robot which would soon become a product of the plant. By a coincidence which seemed symbolic to me, Chagin's baby robot (it did not look at all like a robot, but looked more like an "arm" had appeared on the press) was placed in the corner next to the empty space that had been prepared for the giant Shkoda....

"How did you arrange things with the technologists this time?"--I was curious.

"By an order from the director. They made the robot on a rush schedule and the technologists prepared all the necessary adapters, without any arguments or any corrections. Nobody doubted that this robot was necessary. And it turned out to be simple and technologically up to date."

"...Chagin is stubborn and hotheaded. Try to argue with him," Krupenko first criticizes him and then glorifies him. "Sometimes I try to hold him back: Chagin, you speak more rapidly than you think! But this, of course, is not the case."

The director is satisfied with Chagin's robot--but still there is something with which he is not satisfied, he is gloomy, and his strong, not altogether intelligent-looking hands are squeezed into fists.

"We are late!" He bursts out angrily, having come to a halt in the middle of his office. "We are always late a year or two or three!"

"But you are always the first in the subbranch...."

"But if we had begun the output of robotized complexes before the institute gave us its first experimental model this changeover would have been easier and less painful. We could have done this, we have the forces! Now we must already (although this is not written into any plan!) begin to produce units for the GAP. And we do not even have them yet!"

We walked out onto the street; it was late on a starry evening; there was a light frost; but Krupenko did not see or hear any of this because he was speaking with an unquenchable agitation about the plant. He was fantasizing about that unusual time when the GAP would appear at the plant, when the plant would produce the entire product...just so they were not late!

Do They Need a Sociologist?

When the institute turned the first industrial robot over to the Plant imeni Kalinin the head engineer Krupenko gathered the plant electricians together for their first acquaintance with the electronic control panel--and for psychological effect he clothed them in white smocks....

In the Association imeni Kalinin there has been and still is a desire to approach "in a human way" even purely technical problems. There has been and still is a desire to look at their own plans, achievements and problems "with a view from outside." And therefore a long time I could not understand why there is no sociologist at this enterprise.

N. I. Yendovitskiy: "Our creative groups themselves provide a social approach to problems."

A. G. Krupenko: "They say that one needs a deputy director and one needs a sociologist. But if the director does not handle problems of quality and is not interested in how the people are living,--no new specialists can help the plant."

But still I encountered a situation here which reminded me of the "unfulfilled niche" and helped to find an answer to the question which remained unclear to me even after the explanations of the former and current directors.

A correspondent of the Kalinin factory newspaper took me to a meeting in the forge shop, having promised that "there will be a fight." Krupenko and the secretary of the party committee, Leonid Nikolayevich Sakharov, also knew about the forthcoming "fight" and therefore they came too. The workers were criticizing the shop chief: he was rude, unfair, and "he was glad when he found disorder and could punish someone."

No, he is not rude. Moreover, he addresses the workers: "Be so kind, Ivan Ivanovich." Or at least: "Be a good guy." True, he is sarcastic and with a sharp word can get in a dig about a past error. But he does not punish people

and if he has made a reprimand in an order, it is only after several verbal warnings. He has been at the plant for more than 20 years. He began as a lathe operator trainee. He has been in charge of shops and divisions. He has participated in "health groups."

Having agreed to take charge of the most difficult shop in the plant, which had not yet been touched by the creative ferment, he wanted to "wake people up," to create a "health group" here too, to change and renew everything. During the 2 years when he was in charge the forging shop began to operate more uniformly and it was even a winner in the plant socialist competition. But he did not manage to "wake anybody up."

If only the former apprentice lathe operator could come to an understanding with the workers as quickly as the director Krupenko, who had never been a worker at that plant and had never worked in the shop! His dialogue with the workers became the culminating moment of the meeting. The conversation proceeded in familiar terms, they threw questions out at one another, and they answered without evasive runarounds (later I recalled how Krupenko complained that he could not keep his distance in his relations with subordinates). The workers became less offended and they agreed that "they were not entirely right" and they even allowed several harmless jokes on the shop chief who had calmed down. Although everyone understood that the conflict was not over.

"Perhaps you should not address the workers: 'Be so kind, be so good'? It would be simpler...."

Soon after the meeting I dropped in on the shop chief and we discussed together what he should do next.

"Are those really such bad words?" he answered a question with a question.

"Don't think that I consider myself to be completely right. But polite forms of address have nothing to do with it. I have tried to introduce order here and very few people like this."

"It seems that you wanted to create a creative group...."

"Yes, but first--discipline and order! How can we do without that? There is one worker here. Skilled. Probably even creative. But he was the only specialist of his kind, he dictated conditions to everyone, and he received 550 rubles. Is it really fair to single one person out like that? I assigned an assistant to him--but how was I to pay the 200 rubles to the assistant? It meant that he had 350 of his 550 rubles left. One assistant could not stand it and left--and I assigned a second one.... But he will not forgive me for those 200 rubles until the day I die! He also talked about injustice at the meeting...."

"Perhaps it was not just because of the 200 rubles?..."

"The previous shop chief would ask them: Vasya, stay a half hour and do this and then I will let you off tomorrow and you can go hunting.... But I do not

intend to ask. They should do their duties and work the way they are supposed to!"

"It is sometimes very difficult to determine what precisely they are supposed to do...."

"I want to stir them up.... I call in the specialists and say: let us take a look and think what has appeared in your section during the past 2 years which is good and interesting, and what can still be changed...and they are offended!"

"Perhaps you are too demanding in stirring them up?"

"I cannot understand how they can work with such indifference! A fairly good idea came into my head--I told it to the engineer and asked him to sketch it out. It seemed that he was interested in it. Within a couple of days he reported that he had sketched it. 'Well, and what next?....' He does not understand! I would not have been able to restrain myself--without an order I would have run and filled in the blueprint myself, made it, looked at it and seen how it works.... 'Are you after money!' I said. 'Run and finish it. Fill out an efficiency proposal.' 'I will think about.'...."

"Why should he fill out an efficiency proposal for your idea?"

"Well, and what if he does not have his own ideas?!"

The former participant in "health groups" even groaned from indignation and impotence. "I will hardly be able to work here very long--it is too difficult.... But I see, I still can see this shop as quite different! The hammer operators would not move heavy billets by hand because we would use manipulators, and white smocks would not be necessary--that is foppery, in the shop it would be clean and we would build a sauna."

"A sauna?"

He was indignant:

"Well, the idea is still undeveloped, I would not want to say.... We have already thought of a place--in the basement, good ventilation could be installed there.... In the sauna the workers could be relieved of their tension and fatigue."

The shop chief was silent for awhile as if looking through his internal vision at a fantasy which was springing forth, and said, not very confidently:

"I will try to become...easier to take."

I thought that here, perhaps, it would be good to have the help of a sociologist or a psychologist. But the secretary of the association's party committee, Sakharov, did not agree with me.

"They themselves should understand one another. By themselves!"

This was approximately when I understood—or, rather, found my explanation—why the Association imeni Kalinin still does not have a sociologist. The sociologist, who plays the role of a psychiatrist in the production collective, of course, would help to smooth out the conflict in the forge shop, and make the reactions and mutual evaluations more appropriate. He would probably even help the shop chief to become "easier to take." That is, he would smooth out the atmosphere, pave the way that "clean shop with a sauna" which, in spite of everything, the fantasizer with the complicated character can see. But, it seems, the Kalinin workers do not want to make things easy and to pave this way. Are they right? In my opinion this is a superfluous question. Is it possible to give people the right to maximalism, to difficult searches for the truth?

For it was not a sociologist nor a consulting psychologist who at one time helped Yendovitskiy to create his plant "health groups."

Glass Baths

When you walk deep into the forge shop, turn right and then walk straight forward a little farther you come to the galvanizing section. They fenced off this section and crammed old and new equipment in it in a disorganized way at the time when the roses were just being planted at the plant and the "health groups" had just begun to stir up the atmosphere. At first both Yendovitskiy and Krupenko dropped in on the galvanizers almost every day. Perhaps it was also because in this atmosphere of the section one was immediately struck with a creative virus.

And in the beginning it was difficult. For a long time the section was producing defective work. The elderly workers opposed the engineers with their automation and mechanization and would not clean the anodes, which became oxidized in 20 minutes. Even Krupenko and Yendovitskiy looked upset. The young foreman, Tamara Vasil'yevna Merem'yanina was in no hurry to streamline things, but she felt sorry for the people in despair. After her suggestion for slowing up the oxidation of the anodes, with the addition of antimony the people began to look happier because the section had improved its quality and had met the plan. Merem'yanina was elected efficiency organizer and sent to a congress of the VOIR, and the plant's head engineer, Krupenko, becoming healthier, began to ask her about attitudes and life, and once he asked: "Tamara, think also about the fact that...."

An ordinary event: they noticed, evaluated and began to take advantage of capabilities.... But this disturbed the young woman: "They helped me to feel my power."

And when she and the other specialists in the section still did not have enough power, the senior foreman, Tamara Vladislavovna Shapovalova decisively went to the director himself. "Think," he answered calmly, "thinking is what you and the engineering service are supposed to be doing." Shapovalova left, disenchanted—and after her there came to the section the leading specialists of divisions, whom the director had sent immediately.... "And we understood that they would not let us down at a difficult moment. They would give us

consultants and write new materials and even send someone to another plant for experience, if necessary.... But things will not end in failure. And we were no longer afraid to think about the problems that went beyond our capabilities. We met together--I, Merem'yanina, and other foremen, brigade leaders and workers. One might have been a chemist, another a metal expert, another a welder and another a technologist. A few words, a few phrases.... There was never a case in which one person thought up everything. We streamlined things not for the sake of streamlining, but in order to iron out the 'bottlenecks.'" The manager of the section paused for a moment. "But if you dig down and look for them, you will always find 'bottlenecks.'"

Thus an entire section was "awakened" and became a creative group. Like all normal creative people, they like to make their lives more complicated. If they were not to think they would not find new possibilities for carrying out the growing plan and long ago they would have received the promised and already planned addition to the section. The equipment covers almost two stories, the foremen no longer have any offices, the desks are standing next to the machines. They already understand that unrestrained streamlining is almost harmful to them, but they cannot put a stop to it.

It would have been possible to end our essay here, having recommended to the chief of the forging shop that he look at the small section that takes up a corner of his shop where there is still not enough space to fantasize about a sauna, but there is still room for expansion and collective creativity. I would place a period here were it not for the conversation with an elderly galvanizing worker which took place right before I left. He was one of those who was able to "think together," whom Krupenko himself knew because he was able to intuitively correct technologies in ways that specialist engineers were not always able to do. He unexpectedly began to speak about his profoundly individual, almost artistic fantasy. He was the one who had the idea about the glass baths. He frequently envisions that in immense transparent "aquariums," and not in the present "black boxes" there would be a soundless, smooth technological process. "If one could see through the process, it would be possible to intervene in it immediately if necessary and correct it. And it would be more interesting to work this way. I think that it would be possible to find a method of producing inexpensive unbreakable glass for the baths. For example, we could gather broken bottles (and one person--I read in a magazine--had even constructed a building made of bottles and lives in it--to me it seems beautiful. Especially when the sun goes down), melted with plastic, and find conditions for smelting...."

("Fantasize! Do Not Be Embarrassed To Express..."--the youthful appeal resounded through the personnel.) "Have you told anybody about this?..."--"No, how could I, they would laugh...." And the fantasizer smiled, excusing himself as though he were embarrassed.

I discussed the glass baths with the association's head engineer, Matviyenko. This happened during a discussion which did not relate directly to the galvanizing section. Aleksandr Georgiyevich was thinking out loud about how to bring to unanimity and mutual understanding the designers who did not wish to abbreviate their plans to accommodate today's production conditions and the technologists who were calling upon them to become more disciplined and less

original.... No, the head engineer had no intention of technologically tying the hands of such designers as the mini-robot creator Chagin, but he wanted to join them together into a "group of idea generators." And in order for them not to wander astray or get bogged down, he wanted to create a market supervision which would provide predictions of consumer demand for the "generators."

The glass baths surprised Matviyenko, but not very much. He listened to my discussion seriously; for the moment installing the glass baths in his mind, he looked with an unseeing gaze into a dark window....

"A normal idea," said the head engineer.

I ended up in the galvanizing section of another enterprise, I tried to test the idea. I met with disenchantment. No, one could not see the technological process within the glass baths--it is too concentrated, the space is too densely saturated with light. Well, it sometimes happens that during the designing process an idea--image from memory some real parameter is missing. Does this mean that this time the fantasy has led into a blind alley?

If you think this, reader, it means that you still do not have a good idea of the nature of the Kalinin workers!

Perhaps the Production Association imeni Kalinin will become a part of a larger scientific production association. Will the Kalinin workers be able to retain their character then? Yes, if the scientific production association is headed by a person who is not embarrassed to say to serious and venerable specialists: "Fantasize!"

And I will not be surprised if the next time I come to Voronezh I see a sauna in the forging shop, and in the new, sunny galvanizing section.... It is very possible that glass baths will also appear there, in which we will be able to see the technological process anyway. And perhaps there will be something else that can take place as a result of the glass baths if from the fantasy they single out that rational kernel and logically develop the idea.

Instead of an afterword. But we had occasion to come back to Voronezh much sooner than that. Within a half-year of our first visit with this leading enterprise an unpleasant event took place. The Production Association imeni Kalinin failed to fulfill the plan for 2 months. And although the enterprise had always developed with sharp "leaps" and in its history there had already been declines alternating with upsurges, stable fulfillment of the plan for 14 years had been enough to make people forget about this. And for many this decline was unexpected.

But not for the Kalinin workers themselves. All the specialists of the association with whom I had occasion to speak had experienced the occurrence sharply and painfully, but they considered it predictable.

In their opinion, after 14 years of intensive growth of the volume of products produced, the enterprise was again approaching that critical boundary, and a situation had taken form which recalled the time before the last

reconstruction. Only now the possibilities of "growing out," increasing production areas, no longer existed (this was emphasized in the article above by the general director of the association). A qualitative leap in development is needed.

It is noteworthy that the decline took place soon after the final approval of the association's technical course. I recall that several years ago the Kalinin workers proved that this was necessary, that it was time to increase the output of automated equipment. And, finally, they achieved this: in the plan for 1985 they are to produce 98 percent of the press equipment with means of automation. But at the same time something paradoxical took place: the leaders ended up at a disadvantage. They had lost their reserve for economic maneuvering (previously, by increasing the output of means of automation, they were able to cover the "gap" between the enterprise's capabilities and the planned growth rates). Well, obviously, the Kalinin workers have come up against one of those contradictions which are set forth by life.

I must admit that only now have I gained a completely clear of the words which were repeated at the time of our first conversations by the general director of the association, A. G. Krupenko: "We are late!" Then this phrase seemed coquettish to me: What kind of "delay" and arrears could be meant here at an enterprise which had become one of the leaders of technical progress in the subbranch!

But leaders have their own compressed time, their own accelerated rhythm and rate of development. Many enterprises of the subbranch are just beginning to produce automated equipment. The Kalinin workers are in the lead--preparing for the production of the GAP. But since the time when the course toward automation was written into the plan, it has become a matter of the present day. But where are tomorrow's prospects? The Kalinin workers must step forward, search for something new--all logic of development makes this incumbent on them.

There is no shortage of ideas. The difficulty is that certain great ideas are still like a pie in the sky. And it turns out that even today it is necessary to have the market subdivision which was mentioned at the time of our conversations. Possibly it is time to turn production toward the output of special-purpose products, which was also discussed by the general director. But the strategy and base are not yet prepared for this idea. There is a good reason for this: during the past 3-4 years the main intellectual and material forces of the association have been directed toward realizing ideas related to automation, for, after all, it was necessary to go "against the current" for a long time. But the Kalinin workers do not try to justify themselves. They have failed. The sober economic calculation has not managed to drive out the fantasy.

This was discussed by specialists of the association when considering the reasons for what took place. They spoke not only of how to "meet the plan"

again, but about something larger: how to accomplish a leap into tomorrow. This means that even in this situation the Kalinin workers are remaining true to themselves.

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ROLE PLAYED BY INDICATORS CLARIFIED

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[Article by Yu. V. Kachanovskiy, doctor of historical sciences, professor, Kharkov faculty of the All-Union Correspondence Legal Institute: "Indicators and Their Functions"]

[Text] At the June (1983) Plenum of the CPSU Central Committee they discussed the need for radical improvement of planning and management. Indicators play an important role in the mechanism for planning and management. Their improvement is one of the crucial tasks. How does one carry it out?

We will not resolve this problem through improving individual indicators. Even the dispute about which indicators are more important--physical or value--does not seem very promising. It seems that there should be a different solution to this problem. It is necessary to create a unified system so that each indicator occupies a particular position in it and performs precisely that function for which it is suitable. The idea of creating of a system of indicators has already been expressed many times by economists and managers. But first of all it is necessary to determine the principles for its construction.

Volume Indicators

Oriented toward quantitative growth, they played a mobilizing role during the years of the first five-year plans. But subsequently, as the country's production potential became increasingly powerful, developed and complicated, volume indicators began to manifest a number of serious shortcomings:

they are oriented toward increased expenditure of materials and resources per unit of final product: when the fulfillment of the plan is evaluated in tons or in rubles, naturally, the enterprises are interested in producing more material-intensive and more expensive products;

they do not stimulate the introduction of highly effective technical equipment since this technical equipment, by making the products less expensive and making them less material-intensive and less labor-intensive or providing the

possibility of satisfying particular needs with a smaller quantity of items, thus reduce the volume indicators;

They orient workers toward intermediate and not toward final results;

They enclose the interests of the enterprises, associations and ministries within themselves--toward fulfilling "their own" plan, and they give rise to departmental chauvinism, the division of products into "advantageous" and "disadvantageous" for the manufacturer and thus they derange economic ties; in order to fulfill "their own" plan the enterprises concentrate their efforts on the manufacture of "advantageous" products, failing to deliver the products that are necessary to the consumers.

We have been criticizing volume indicators, sometimes very sharply, for about 30 years. For example, as early as 1956 PRAVDA ran an article on this subject by the chief of the technical administration of the USSR Ministry of Ferrous Metallurgy, A. F. Myrtsyomov.¹ Articles, brochures and books criticizing volume indicators were published in the 1950's-1980's. But no significant change has been achieved--volume indicators are, as before, directive and evaluative.

At a meeting of the PRAVDA business club, a report of which was published on 17 March 1983, a rejoinder rang out from the floor: "But, after all, the gross output has long been excluded from the system of directive indicators...." To which the director of the Smelyansk machine-building plant, I. Yedneral, answered with complete justification: "You can discuss that in lectures, but in fact it prevails as much as it ever did."

There arises the question: But why do volume indicators dominate as before? This is usually explained by "inertia" and "backward thinking." It seems, however, that this thesis distracts us from searching for a solution to the problem. It is necessary to search for concrete reasons for shortcomings, including those which are originated by volume indicators, and concrete ways of overcoming them. The problem cannot be solved by refraining from volume indicators. They are objectively necessary and we cannot do without them. Why?

The balance method is the basis of planning. Further improvement in planning requires raising the level of balance of the plans. The USSR Gosplan and Gossnab have developed for the current five-year plan, with a breakdown for the various years, balances for 625 kinds of products.² The role of balances is increasing more and more.

The amounts included in the balance equation must be measured quantitatively, and to do this they must be brought together and reduced to some single quality--weight (tons) or capacity (horsepower) or value (rubles) and so forth. Here is where we need gross output indicators which provide for commensurability.

So the function of volume indicators is measurement and regulation of the proportions of the economy through national economic balances. It is no accident that they are sometimes called measurements. The utilization of

volume indicators in this function does not lead to any negative consequences. But in those cases when they are used to stimulate quantitative growth of production or evaluate the work of ministries, associations and enterprises, those negative phenomena discussed above begin to arise.

Quantity and Quality

During the years of the first five-year plans quantitative growth in terms of all physical and value indicators was, as a rule, necessary. Things are different today, when it is necessary to utilize effectively the powerful production potential that has already been created. Quality is now more and more frequently preferable to quantity.

It is necessary to reject the outdated idea that quantitative growth must necessarily take place in terms of volume indicators. V. Tereshchenko accurately called such planning "targetless-program": "The plan is frequently changed from a means of achieving the goal into a goal in itself and is fulfilled in order to report that it has been fulfilled."³ Thus in order for volume indicators not to generate shortcomings, it is necessary first of all to put a stop to their utilization as stimulation for quantitative growth, for this function has ceased to be useful.

This will require not only overcoming backward thinking, but also a serious restructuring of planning so that it will have a target-program basis and not be oriented toward growth as such. Target programs are becoming not only an organic constituent part of the plans, but also the basis for them, their main pivotal point, so that all quantitative positions are subordinate to them. In keeping with the system of comprehensive target programs, it is necessary to determine the positions of the plan from which one should provide for rapid quantitative growth, from which one should provide moderate growth, and from which there should be stabilization or, possibly, even a reduction of the volume of product output. Apparently, the first group (rapid growth) should include only those kinds of products and results of economic activity which provide for eliminating "bottlenecks," raising the economy to a higher scientific and technical level, and solving important social problems.

The refusal to be oriented toward growth in terms of all volume indicators will rid the national economy of large losses and unjustified expenditures. Consequently, national income will grow at a more rapid rate, which will make it possible to develop progressive areas in the economy and to solve social problems more rapidly.

Consumer Value

At the November (1982) Plenum of the CPSU Central Committee it was emphasized that the main criterion for evaluating the work of the ministries--"is the degree of satisfaction by the branch of the constantly growing public demands." But how does one evaluate the satisfaction of demands? Volume indicators are unsuitable for this.

The economic category which can be used to evaluate the satisfaction of demands is the consumer value. One of the main shortcomings in the current

economic mechanism is the orientation toward volume indicators and the inadequate accounting for the criterion of consumer demand. The latter is a purely qualitative and concrete category. The real contribution of the enterprises, associations and ministries to the national economy and to the satisfaction of the needs of the population is measured not in volume sales and not in prompt fulfillment of the plan, but consumer values which are created and transferred to the clients. The contribution will be optimal when one manufactures products of high quality and precisely of those parameters which provide the best final result, when the manufacturer strictly adheres to the assortment and products list necessary to the clients, when each kind of product is manufactured in the quantity in which it was ordered, and consumer goods--in keeping with the demand, when the products are dispatched strictly according to schedule.

Ways of Achieving This

How does one reorient the economic mechanism toward complete, all-around accounting for the criteria of consumer value?

The solution can be found only on the paths of improvement of economic relations and the corresponding restructuring of the economic mechanism. Here, in our opinion, one should solve the following problems:

providing for balance of the economy through the development of plan balances with sufficient reserves; overcoming the dominance of the supplier over the consumer;

improving price setting so that the prices are to a greater degree "prices of effect" and reflect more fully the consumer value of the items;

establishing as the main indicator for the evaluation of the work of the enterprises, associations and ministries the fulfillment of commitments under contracts, schedule-orders, and other orders;

refraining from the evaluative functions of volume indicators.

Within a single article, of course, it is not possible to discuss all of these areas, and we shall discuss only those which are related to the construction of the system of indicators.

Why should the main indicator for evaluating the work of enterprises, associations and ministries be the fulfillment of commitments under contracts, schedule-orders and other orders? The fact is that the real contribution to the national economy and to the satisfaction of the needs of the population can be evaluated only in the process of the conclusion and execution of agreements between the manufacturers of the products and their consumers (and also supply and trade organizations). Only agreements can embrace all of the concrete parameters of consumer values.

In recent years more and more attention has been devoted to strengthening contractual discipline. As early as 1977 a normative document was issued which linked directly the bonuses of managers, engineering and technical

personnel and employees of enterprises and supply organizations to the fulfillment of commitments under agreements.⁴ The decree of the CPSU Central Committee and the USSR Council of Ministers concerning improvement of the economic mechanism of 12 June 1979 noted that the evaluation of the results of the economic activity and incentives should be provided on the basis primarily of the fulfillment of deliveries in keeping with the products list (assortment) and the time periods stipulated by the agreements (orders) that are concluded. The decree also pointed out that the formation of material incentive funds should also be made dependent on this. In the basic provisions concerning the formation and expenditure of incentive funds in industry, which were approved in March 1983, it was established that with the fulfillment of commitments under agreements (orders) the material incentive fund is increased by up to 10 percent, and when these are not fulfilled it is reduced correspondingly. If the plan has been overfulfilled in terms of production of products (in volume), but commitments under the agreements have not been met, the additional deductions are not made into the incentive fund.⁵ In 1981 instructions were issued from the USSR Gosplan, the Gossnab, the State Committee for Labor and Wages, the Ministry of Finance, the Central Statistical Administration and the AUCCTU, which established more rigid requirements regarding the fulfillment of commitments under agreements (orders). Thus many normative documents have been adopted regarding these issues. But so far they have not produced the necessary result.

In the decree of the CPSU Central Committee and the USSR Council of Ministers of 11 April 1983, "On Serious Shortcomings in the Observance of Contractual Commitments for Delivering Products and Increasing the Responsibility of the Ministries, Departments and Enterprises in This Matter," it was noted that a considerable number of associations and enterprises do not completely fulfill their contractual commitments to the consumers. In 1982 industry fulfilled the plan for sales volume by 100.6 percent, but taking into account the fulfillment of commitments under agreements, orders and schedule--orders--it was only 97.1 percent. Almost every third enterprise has not fully carried out agreements. In 1983 industry fulfilled the plan for sales volume by 101 percent. The fulfillment of commitments under agreements, orders and schedule-orders improved somewhat. But, as the USSR Central Statistical Administration announced, the enterprises and associations of a whole number of ministries have allowed a "significant arrears in their fulfillment." At the December (1983) Plenum of the CPSU Central Committee it was noted that a number of ministries of machine building in 1983 permitted almost half of their enterprises to have a maximum percentage of underfulfillment (it amounts to 2 percent and in individual cases--3 percent, according to the instructions of 1981). In the USSR Ministry of Light Industry in 1983 more than 60 percent of the enterprises failed to fulfill their commitments for deliveries.

Underfulfillment of commitments to the consumers, even by a couple of percentage points, is certainly not trivial. A breakage in one link can lead through the chain to breaks in many other links, and the losses grow into a landslide. Additionally, the unreliability of deliveries and services gives rise to such phenomena as "bartering" and above-normative supplies, which also reduces the effectiveness of the economy. Consequently, the task of 100 percent fulfillment of commitments under agreements (schedule-orders, orders) remains one of the most crucial ones. It is not difficult to solve it, and a

complex of measures is necessary for improving economic relations. We are directed to this by the decree of the CPSU Central Committee and the USSR Council of Ministers, "On Additional Measures for Expanding the Rights of Production Associations (Enterprises) of Industry in Planning and Management Activity and Increasing Their Responsibility for the Results of Their Work," of 14 July 1983.

In order for fulfillment of commitments to the consumers to become truly the main evaluating indicator, it would be expedient, in our opinion, to refrain from evaluating the results of economic activity in terms of volume indicators, since volumes (tons, rubles, units) far from always coincide with the satisfaction of the interests of the consumers. Work oriented toward volumes is frequently an economically pointless transfer of resources. It is known that we are still manufacturing unmarketable products worth tens and hundreds of millions of rubles. This takes place because the evaluation of the work in terms of the volume indicator impedes accounting for the criteria of consumer value. Nonetheless the results of economic activity reflected in volumes still remain the basic ones. Such is the situation that still prevails in practice. It is necessary to depart from it and overcome it.

We must eliminate the link between the incentive and bonus funds and volume indicators. Material incentives should be made dependent on the fulfillment of commitments to the consumers and the quality indicators of the work.

The principles of forming incentive funds should place in a privileged position those collectives who completely fulfill commitments to the consumers. Since the beginning of 1984 a number of ministries have been conducting an experiment in new management methods. If the enterprises participating in the experiment meet all of their commitments for deliveries in keeping with the agreements that have been concluded and the schedule-orders that have been accepted for execution, their material incentive funds are increased by 15 percent. For each percentage point of underfulfillment of commitments for deliveries the incentive funds are reduced by 3 percent. Bonuses for management personnel are also made dependent on the fulfillment of commitments for deliveries, and they increase significantly with 100 percent fulfillment. Thus one provides for direct material incentives of the collectives for 100 percent prompt fulfillment of orders for the delivery of products to the consumers. The first months of 1984 show that the experiment had produced results which we had previously not been able to achieve. Thus the enterprises and associations of the USSR Ministry of Heavy and Transport Machine Building in 1983 fulfilled commitments for deliveries by only 94.5 percent, and in the first quarter of 1984, working under the conditions of the experiment--by 99.8 percent. The number of enterprises that are not fulfilling their commitments under agreements decreased to less than one-fifth the previous number in this ministry.⁶

In order to strengthen contractual discipline it would be quite important to further improve the work of arbitration boards and to strengthen legal responsibility. Responsibility for failure to meet commitments under agreements or their improper fulfillment still has not become inevitable. In the 1970's in USSR industry sanctions for violation of contractual commitments were applied in only 30 out of 100 cases. The decree of the CPSU Central

Committee and the USSR Council of Ministers, "On Improving Planning and Strengthening the Influence of the Economic Mechanism on Increasing the Effectiveness of Production and Improving the Quality of Work," of 12 July 1979 instructed: "To establish that sanctions envisioned by law or the agreement for violation of contractual commitments for the delivery of products are applied mandatorily...." But in practice we have not managed to full adhere to this prescription. There are still frequent cases in which the consumers, afraid of "spoiling relations" with the suppliers or fearing "conflicts with their own people (in the territory or department)," do not apply the sanctions. It seems that this situation can hardly be rectified by administrative prescriptions alone. It is necessary to increase the material responsibility of the clients and the consumers in applying sanctions against undisciplined suppliers.

If the indicator of the evaluation of the work of the enterprise is the fulfillment of commitments under agreements, schedule-orders and orders, and the work of the ministry is evaluated in terms of the fulfillment of the plan in volumes and volumes are used to evaluate the results of the competition among rayons, cities, oblasts and republics, then the enterprise experiences insurmountable pressure from above and from local agencies. Actually, the "gross output" still ends up to be the indicator for evaluation of its work. Consequently, for fulfillment of commitments to the consumer, apparently, we must evaluate the work not only of enterprises and associations, but also of all-union production associations and ministries; in the territorial cross-section it would also be expedient to evaluate the results of the competition primarily in terms of fulfillment of commitments to the consumers.

Agencies of the Central Statistical Administration should take into account the fulfillment of commitments under agreements (orders) by the enterprises (associations) and ministries, and also in the territorial cross-section--by the rayons, cities, oblasts, krais, and republics. In the summaries of the Central Statistical Administration it would be desirable to introduce a graph: fulfillment of commitments under agreements, schedule-orders and orders by ministries (for each ministry--a summary indicator reflecting the fulfillment of commitments by all the enterprises under its jurisdiction) and republics (for each republic--a summary indicator reflecting the fulfillment of commitments by all the enterprises located on its territory).

The Main Indicator of the Evaluation of Work and Planning Assignments

If the fulfillment of commitments under agreements, schedule-orders and orders becomes the main evaluation indicator, how does one combine it with planning assignments for the output of products? The latter are established on the basis of planned balances and calculations. It was noted above that the amounts included in the balance should be commensurable and, consequently, expressed in volume indicators. On the other hand, the enterprises are required to give the national economy not "gross output," but consumer values strictly in keeping with the agreements, schedule-orders and orders. Is there not a contradiction here? There certainly is, and it is necessary to search for ways of resolving it.

Attempts are being made to find indicators which could become measurements in balances and calculations and at the same time could reflect the consumer properties of the product. Is it possible to find such indicators?

Planning the output of paper in tons contributed to increasing the expenditure of raw material and energy per 1 square meter of paper and to the shortage of high-quality fine paper which the consumers needed. At the Solikamsk Combine they began to plan paper production in square meters. The results of the experiment turned out to be positive. The output of paper turned out to be 1,100 tons less than was previously planned. But there were no complaints for the consumers and all of the orders for paper were filled. The collective produced 72 million square meters of fine, higher-quality paper in excess of the plan. There was also a considerable savings on raw material and energy.⁷ Thus in this case the indicator of "square meter" is considerably better than "ton." It is also quantitative and therefore quite acceptable as a measurement in balances. At the same time it reflects one of the most important characteristics of the paper for the consumer--its area.

There arises, however, the question: if for particular needs (for example, for packing) it is necessary to have thick, durable paper, how does the indicator of "square meter" affect the satisfaction of these needs? Thick paper becomes disadvantageous for the manufacturer and, consequently, in short supply. This can lead to large losses--the packaging of many kinds of products will deteriorate as will their protection.

Paper is a relatively simple thing. And how would find an indicator for complicated equipment? For its consumer value cannot be reflected either by the ton or by the square meter or by the piece; it can be reflected only with a concrete description in the agreement or other document which is coordinated between the client and the manufacturer.

We are coming to a conclusion: it is impossible to combine the uncombinable and create volume measurements which at the same time will optimally reflect the consumer values. Consequently, the contradiction between planning assignments for producing products, which are established in volume indicators, and the main evaluation indicator (fulfillment of commitments under agreements, schedule-orders and orders) must be resolved in another way. Various indicators should correspond to various functions.

Three Stages in the Economic Process

It seems that dividing up the functions and correspondingly ranging the indicators can be done according to the stages of the economic process. There are objective justifications for dividing it into the following stages.

First--comparison of planning balances and calculations and, on the basis of this, establishment of assignments for the ministries, associations and enterprises for the output of products. In this stage the volume measurements "work." Naturally, they also reflect planning assignments for the output of products.

The second stage--on the basis of planning assignments for the output of products, agreements are concluded between the producers and consumers, and schedule-orders and orders are accepted for execution. The directive force of the planning assignment is realized in this stage. It would be possible to establish material responsibility of the ministries and enterprises for the refusal to accept "disadvantageous" orders, under the condition, of course, that these orders are within the boundaries of the planning assignment and are supplied with resources.

The second stage culminates with the conclusion of agreements and the acceptance of orders for execution.

The third stage is the fulfillment of agreements, schedule orders and orders. After the conclusion of agreements and the acceptance of orders for execution, the volume indicators should completely lose their force. In this stage they have neither directive nor evaluative significance. In no case should they be made the goal of socialist competition. It should be 100 percent fulfillment of all agreements, schedule-orders and orders with high quality, strictly within the established time periods, and fully in keeping with the products list and assortment established in the agreements, and with minimal expenditures of resources.

If in the third stage the ministry (or the enterprises under its jurisdiction) fulfills the orders and order-schedules by 100 percent, but the volume indicators for the output of products are less than initially planned (in the first and second stages), this results should be regarded as positive, as economical, effective work. Point 11 of the decree of the CPSU Central Committee and the USSR Council of Ministers of 12 July 1979 permitted us to reduce the overall quantity of items produced as compared to that established by the plan as well as other volume indicators when this is associated with the changeover to the output of more effective products or new goods of a higher quality.

One must also keep in mind that the majority of volume indicators are expenditure indicators, that is, they reflect not the results of production (results that are useful for the society can be expressed only in consumer values), but its expenditures. Of course one cannot rule out an increase in volume indicators either, but only in those cases when this is economically useful and leads to an increase and an improvement of consumer values.

We have considered the question of the possible ranging of indicators (dividing them into stages of the economic process and functions performed) using the example of volume indicators and the indicator of fulfillment of commitments to the consumers.

It seems that an analogous approach would be applicable to all indicators used in the economic mechanism. One should refrain from being oriented toward a system where all indicators should increase, improve or rise. Each indicator performs a function for which it is suitable, in the particular stage of the economic process and at the particular level (enterprises, association, ministry) at which this function is objectively necessary.

What should we use as a guideline when determining the position and function of each indicator? By the way it orients us toward the optimal final results, the fulfillment of target programs, the creation of conditions for scientific and technical progress, the solution to social problems and more rapid growth of the national income.

An analysis of the indicators from the standpoint of their functions will also make it possible to reveal superfluous, useless ones, which only clog up the channels of administration with unnecessary information and impede the work. It is necessary, naturally, to get rid of such indicators.

FOOTNOTES

1. See: Myrtsyomov, A. F., "Planning, Lagging Behind Life," PRAVDA, 1 June 1956.
2. EKONOMICHESKAYA GAZETA, No 1, 1982, p 2.
3. Tereshchenko, V., "What Should the Manager Do?" LITERATURNAYA GAZETA, 9 September 1981.
4. EKONOMICHESKAYA GAZETA, No 36, 1977.
5. EKONOMICHESKAYA GAZETA, No 15, 1980, pp 5-6.
6. See the article by the minister of heavy and transport machine building, S. Afanas'yev, "The First Steps. Economics: A Large-Scale Experiment," PRAVDA, 3 May 1984.
7. Cherepanov, V., "The Solikamsk Experiment," PRAVDA, 22 November 1981.

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SIGNIFICANCE OF SOCIAL FACTORS ANALYZED

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[Article by N. V. Chernina, candidate of economic sciences, Institute of Economics and Organization of Industrial Production of the Siberian Branch of the USSR Academy of Sciences (Novosibirsk): "Directors--On Social Factors in Production Effectiveness"]

[Text] For 2 decades our institute's sector for social problems of industry and construction have been engaged in a study of processes of the formation and stabilization of personnel. The research program also included a questionnaire conducted in 1982 of industrial executives of Altay Kray concerning the possibilities of increasing the effectiveness of production as a result of social factors. The questionnaire of the directors was to show that they think about labor problems and how they experience the critical nature and the need to take one measure or another.

In keeping with the "questionnaire of executives," 64 directors of industrial enterprises and associations of four Altay cities were questioned. In this article we have used the materials of the observations in Barnaul and Biysk, related mainly to the social aspects of increasing labor productivity.

What Impedes Fulfillment of the Plan for Increasing Labor Productivity

Labor productivity in industry in Western Siberia is increasing at more rapid rates than in the RSFSR as a whole. Nonetheless the planning assignments are sometimes fulfilled only after they have been reduced. What is the matter? The executives singled out three major causes:

the technical level of production (29.3 percent of all the responses);

the quality of the labor force (29.3 percent);

shortcomings in material and technical supply (27.6 percent of all the responses).

The inadequate technical level of production is manifested above all in the poor mechanization of work and the existence of outdated or unrepaired

equipment as well as a high proportion of manual labor. At the majority (89.6 percent) of the industrial enterprises that were investigated, the five-year plans for economic and social development included assignments for reducing manual labor, and at 75 percent of the enterprises these assignments were broken down for the various years. But analysis shows that the earmarked measures were inadequate. At only 58 percent of the enterprises did the number of workstations that used manual labor decrease significantly during the course of the 11th Five-Year Plan. Not until 1990 will it be possible to expect a significant reduction of work stations that utilize manual labor.

The managers were asked to evaluate the possibilities of mechanization of labor at their enterprises and to indicate the proportion of workers engaged in manual labor. In the opinion of those who were questioned, the proportion of workers whose labor could be mechanized with relatively simple and inexpensive means of mechanization amounts to 18.3 percent; in the process of comprehensive mechanization of production with technical re-equipment of the enterprise--35.7 percent; those whose labor cannot be mechanized in the near future because of the specific conditions for its performance--45 percent.

Attention is drawn to the estimate of the proportion of workers of the first group. It is low, although it is precisely mechanization on the basis of simple means that is the most feasible in the near future. The production of such means can be organized at auxiliary sections of machine-building enterprises as well.

What is impeding the fulfillment of assignments for reducing manual labor? Those who were questioned named first of all the shortage of equipment and means of mechanization as well as their poor quality. Additionally, the directors referred to the limited possibilities of manufacturing equipment at their own plants because of the loading of the sections with nonstandard equipment, the weakness of the experimental base, and so forth.

The next in significance was difficulty in developing technical solutions for mechanization of labor, and behind these there are at least three causes: the unpreparedness of the designers and technologists; the specific conditions for production and its small-series nature with large products lists; shortcomings in organizational work for reducing manual labor at the enterprise. Other difficulties were also named: the unadaptability of production areas, the outdated arrangement of the enterprise. They could be eliminated only with reconstruction.

At the present time the removal of outdated equipment and updating of the production apparatus is being influenced positively by the practice of certification and streamlining of work stations, which is becoming widespread in the country. Raising the technical level of production is becoming mandatory and it does not depend on the desires of the manager.

The quality of the labor force. On the same level with the technical factor, the directors placed the human factor which, in their opinion, has no less of an effect on the fulfillment of assignments for increasing labor productivity. They were asked the question: "In terms of what parameters would you mark the greatest deviation in the qualities of the labor force from the requirements

of production?" The concept "labor force" included three categories: engineering and technical personnel, managers and workers, and the set of qualities envisioned in the questionnaire--the ability to manage people, to utilize and introduce new experience, the correspondence of the education to the position, skills, generalized and specialized education, and health. The proposed spectrum of characteristics of the quality of the labor force seemed inadequate to the experts, and they augmented it with such qualities as love for the job, discipline, interest and initiative.

The variant of the answer "the quality of the labor force corresponds to the requirements of production" was marked by an extremely small number of experts: with respect to workers and managers--6.2 percent of the directors questioned, and with respect to engineering and technical personnel--4.2 percent of those questioned. It is necessary to have some interpretation of such a low opinion of the quality of the labor force on the part of the experts.

For production managers the main quality is the ability to manage people. Yet 69 percent of the experts think that the managers do not have enough of this ability and that they are far from meeting modern requirements. Evaluating the ability of production commanders to utilize and introduce new experience, 44 percent of the experts indicated an arrears in this quality. The lack of correspondence between the level of education and the position was indicated by 27 percent of those questioned, including special education--25 percent.

It is inconceivable to have an engineer who does not have the ability to utilize and introduce new experience. About 58 percent of the directors indicated an inadequate level of this ability in the given category of workers, 54 percent--a lack of an ability to manage people, and 33 percent--the lack of correspondence of the education to the position.

The worker is usually evaluated primarily in terms of the qualifications reflected in his category. The result: 69 percent of the experts indicated that the level of qualifications did not meet the requirements of production. An inadequate level of general and specialized education was indicated by 23 percent of the experts.

The characteristics of the quality of the labor force included health as well. All of the experts agree with the importance of this factor and noted that the condition of the health does not always meet the requirements of production. This was said about the health of the workers by 33 percent of the directors, about the health of engineering and technical personnel--13 percent, and about the health of functional managers--15 percent.

On the whole the evaluations of the qualities of their subordinates which were given by the managers of the enterprises could not be called high. This once again shows the complexity of the task of increasing the effectiveness of production which faces managers and labor collectives, and the need for immediate measures to improve the quality of the labor force--the main element in productive forces.

Dynamics of Attitude Toward Labor

The qualitative characteristics of the workers include their attitude toward their labor as well. We tried to clarify how this has changed in a relatively short segment of time (5-10 years). To this end the managers gave an evaluation of the changes of three of its indicators (desire to increase labor productivity, desire to improve the labor process, and labor discipline) of engineering and technical personnel and workers.

The results are as follows: the majority of managers noted a change in attitude toward labor even after such a short period, and about half of them noted the need to raise the first indicator for workers and the third for engineering and technical personnel. Although the evaluations for the second indicator turned out to be considerably better for both categories of workers, a considerable proportion of the experts still think that no positive changes have taken place. It would be desirable for the process of developing an active type of worker to take place more dynamically.

The managers were concerned most of all about labor discipline. Some of the managers think that the condition of labor discipline has improved. (Let us recall that the questionnaire was conducted in October 1982.) They are bothered by the fact that the problems of discipline pertain not only to workers, but also to engineering and technical personnel. The reduction of the coefficient of turnover that has been observed in recent years has taken place as a result of the reduction of people leaving at their own request, and those who have been discharged because of absenteeism and other violations of labor discipline have not changed much.

What kinds of labor discipline bothered the managers most of all? Almost all of them said absenteeism, tardiness, and early departure from work. They also noted intrashift idle time for which the workers were to blame, failure to carry out orders and a negligent attitude toward equipment and material values.

What is the reason for the deterioration of the attitude of some of the workers toward labor? A complete list of the causes indicated by those questioned is presented in Table 1.

It is noteworthy that the majority of those questioned named shortcomings in the management of people as a reason for this phenomenon. Special emphasis was placed on the lack of strict measures imposed because of poor work (70.2 percent). The managers insist on strengthening external control which, in their opinion, should compensate for the inadequate conscientiousness and responsibility of the workers.

Among the difficulties on the path to increasing labor productivity which were mentioned in the questionnaire, there was no direct reference to the low intensiveness of labor and the low labor return. We ask those who were questioned to estimate which part of the workers at the enterprise do not work at full force. The estimate turned out to be the same for various categories of workers. Of course, it is objective and does not enable us to determine quantitatively the labor reserves that are at the disposal of the enterprise.

The only thing that is clear is that these reserves are significant: according to an expert estimate, 17 percent of the functional managers, 22 percent of the engineering and technical personnel and 20 percent of the workers do not work at full force.

Table 1--Factors Causing Deterioration of Workers' Attitude Toward Their Labor

<u>Factors</u>	<u>Proportion of Directors Who Noted the Corresponding Circumstances</u>
Shortcomings in planning	42.6
Weak sense of responsibility in workers	68.1
Inadequate working conditions	21.3
Poor technical equipment	10.6
Heavy work	23.4
Payment does not correspond to labor expenditures	17.0
Impunity with poor work	70.2
Unskillful organization of labor	17.0
No provision of housing, children's preschool institutions	53.2
Influence on basic work from earnings "on the side"	36.2

The questionnaire was conducted at a time when we had not yet made the most important decisions concerning improvement of discipline. At the November (1982) Plenum of the CPSU Central Committee they pointed out the need to wage a decisive struggle against any violations of state, labor and executive discipline. In the summer of 1983 they published the decree of the CPSU Central Committee, the USSR Council of Ministers and the AUCCTU as well as the USSR Law Concerning Labor Discipline, and these were followed by instructions from the December (1983) Plenum of the CPSU Central Committee concerning the discipline of long-term deliveries, and so forth. And the ones who turned out to be right were the managers who expected such measures and the effect from them. As in the country as a whole, the indicators of management in Altay Kray for 1983 and the first half of 1984 had improved appreciably as compared to the preceding 5-year period, to which the aforementioned negative evaluations of the condition of labor discipline pertain.

What Keeps the Manager From Making the People Work Better?

Four reasons were given for this. First, the unfavorable labor market conditions (shortage of personnel, surplus of work in the city, the possibility of leaving for another enterprise where the demands are less, and so forth). Second, shortcomings in the style of managing personnel--ineffective measures of influence, weak demands on the part of the managers, unsatisfactory control over execution, inadequate rights of managers to take effective measures against violators of labor discipline. Third, shortcomings in the organization of material interest on the part of the workers and the results of their labor. Fourth, shortcomings in the organization and planning of production, especially its irregularity because of poor supply.

Let us give a couple of ideas about the personnel shortage. Here are the data from statistics: industry in Altay Krai is provided with labor resources in the amount of 98.1 percent of the plan, that is, the shortage of labor resources amounts to 1.9 percent.¹ But there is no secret about the serious shortcomings in the utilization of the labor force. The real possibilities of economizing on labor as a result of better utilization of it, according to our calculations, in industry in the krai amount to at least 2.7 percent of the industrial production personnel.

Since 1980 there has been a limit on the number of workers and employees, and the statistical administration regularly provides data concerning the actual number of industrial production personnel in percentages of the limit in the various economic regions, krays and oblasts. But this indicator is not very suitable for evaluating the provision of labor. According to the July (1979) decree of the CPSU Central Committee and the USSR Council of Ministers concerning improvement of the economic mechanism, the limit is the upper allowable level. But it is actually planned from the base number of employees, and not on the basis of normative indicators and, consequently, it is not oriented toward mobilization of hidden labor reserves at the enterprises.

When determining the need for personnel, as a rule, the administration proceeds from the number of vacant positions. The requests for labor force which are made on the basis of this are submitted to the bureau for labor placement and information of the population. As our analysis showed, when calculated this way the amount of the shortage of labor force exceeds threefold the shortage established in percentages of the limit of the allowable number.

At the present time work positions are not taken into account in statistical reporting and planning. We have made an attempt to take vacant positions into account at a number of enterprises of Barnaul. There were quite a few of them: in the mass occupation of machine tool operator alone at 60 percent of the machine-building enterprises from 6 to 21 percent of the work positions remained unfilled throughout the entire year.

What are the prospects for changing the disbalance of the labor force and the work positions? More than one-third of the directors fail to indicate any prospects. About half of them think that at their enterprises the number of vacant working positions will remain the same until 1990. Thus, on the one hand, the managers do not plan to eliminate the empty work positions and, on the other, some of the positions that are occupied today will not find a "master" tomorrow. Obviously it would be expedient to arrange for the sale or renting of excess equipment to those enterprises which are experiencing a critical shortage of it. Only 13 percent of the directors who were questioned anticipate a significant reduction of the number of permanently vacant work positions during the years of the 11th Five-Year Plan, and 3 percent--during the 12th Five-Year Plan. Consequently, in the sphere of reproduction of work positions there will be no appreciable changes.

We do not have descriptions of the permanently vacant work positions, but it is not difficult to assume that these are mainly unattractive positions with outdated equipment. Judging from the questionnaire, right up until the year 1990 their number will not change at 19 percent of the enterprises, and at 6 percent of the enterprises they will even increase during the 11th Five-Year Plan.

The situation could change significantly if in the practice of planning we would reflect indicators of the work positions. In a number of ministries, in Leningrad Oblast and in Dnepropetrovsk they are already doing work for accounting for, analyzing and reducing the number of work positions and certifying them. The main goal here is to coordinate the number of able-bodied population, the number of work positions and the limits on the number of workers and personnel, and also the fulfillment of the planned shift of labor resources. It would be expedient to disseminate this experience throughout the enterprises of Altay.

Around Turnover

If there are many vacant working positions, the increased labor turnover does not make us wait. It is interesting that not a single director mentioned mandatory zero coefficient of discharges at the request of the workers. Apparently the formation of this idea had been influenced by the results of many years of work on the part of our institute and statements of workers in various audiences of Altay in which they always pointed out the existence in general form of labor turnover as something normal, something socially necessary. In the questionnaire it was determined by experts as an average of 11 percent (with a significant differentiation among the various branches). The actual level of discharges at the request of the workers was higher than normal for enterprises of machine building and the food industry, in the chemical and light industry and in the construction materials and wood-processing industry.

The enterprises are doing a certain amount of work for reducing labor turnover, but, as a rule, it is not comprehensive and not all of the arsenal of possible measures is being utilized. Even those that do not require additional capital investments, for example, the creation of public personnel divisions, measures for adaptation of newcomers to production, and the removal of limitations on intraplant transfers are being fully utilized at only 27 percent of the enterprises that were investigated. Moreover, the selection of measures applied by the ministries and departments is very scanty: with respect to one-third of the enterprises the higher agencies are limited only to verbal encouragement; it is equally that they deprive an enterprise of its class position in socialist competition because of its high level of turnover. Even more rarely are economic measures of influence taken: reduction of the amount of bonuses for the results of the year is utilized for only 10 percent, and incentives for reducing turnover in the form of allotment of more funds for proportional housing construction and the construction of kindergartens--at 6 percent of the enterprises. At the same time one cannot but note the inadequate consistency. Thus incentives for reducing turnover were applied by the USSR Ministry of the Textile Industry for only one enterprise of the four under its jurisdiction that were investigated, and the Ministry of the Timber,

Pulp and Paper and Wood-Processing Industry--one of the three, and the same was true of the USSR Ministry of Construction.

According to our figures, from 60 to 80 percent of those who come to industrial enterprises were previously employed at enterprises of the same city. To the question: "Are there enterprises in the city which regularly hire labor force away from you?"--63 percent of the directors answered affirmatively, and one-third of them indicated specific plants. Half of the directors think that they manage to hire workers away with undeservedly high earnings.

In addition to the high earnings, workers are attracted by certain goods and advantages which can be guaranteed by work at a given enterprise. As one of the managers in an interview said: "If 20-30 years ago young people strove to get into an enterprise of the chemical or light industry, or machine building, now they try to get into the sphere of services (salesmen, hairdressers and so forth), that is, in places where it is possible to obtain easy incomes."

Housing and Preschool Institutions of the Enterprises

The worker receives most of his social and domestic benefits through the enterprise, and therefore large differences in the consumption of these benefits by workers of various branches are inevitable (see Table 2).

Table 2--Provision of Accommodations in Children's Preschool Institutions at Enterprises of Various Branches

Branch	Proportion of Workers With Children of Preschool Age and Provision of Accommodations in Children's Preschool Institutions, %
Machine Building	80.6
Chemical	75.0
Light	80.6
Food	70.7
Wood-processing	89.3
Construction materials industry	91.0
Average for all enterprises	80.3

Among the social benefits the most important place is occupied by housing. In our country this is reflected in the gigantic development of housing construction. A significant contribution to the implementation of the housing program is to be made by associations, enterprises and organizations.

The housing problem is being solved in various ways and from various sources. At the majority of enterprises investigated the funds for housing construction are allotted by the ministry. Only 17 percent of the enterprises allotted the necessary (up to 50 percent) money from the fund for social and cultural measures and housing construction. The majority of directors think that it is not necessary to increase this proportion but, on the contrary, it is necessary to reduce it, and to increase correspondingly the investments from the ministries.

At the overwhelming majority of enterprises (86 percent) the housing is constructed centrally, through the capital construction administration of the gorispolkom. And 62 percent of the enterprises investigated carry out construction only in this way; the managers, as a rule, would like to retain this situation.

Housing is constructed by the internal method at 28 percent of the enterprises, but the managers would like to reduce this proportion in favor of centralized and cooperative construction, thus relieving themselves of excess concerns. At the time of the investigation cooperative construction with loans from the enterprises was utilized at only 6 percent of the enterprises, whose managers, incidentally, would like to increase this proportion. Another 22 percent of the directors link the solution to the housing problem to increasing cooperative construction using loans from the enterprises, and although these directors have not used them, they consider it expedient for this proportion of all the methods of housing construction to amount to approximately 27 percent.

At the meeting with the voters of the Kuybyshev Electoral District of Moscow on 2 March 1984 K. U. Chernenko said: "We all, of course, understand that the housing problem is far from solved, and we will be searching for ways of further improving housing conditions. And not only with government funds. It is probably necessary to proceed more boldly toward expansion of cooperative fundamentals and individual construction as well."²

Action Should Be Preceded by Readiness for It

Party decisions direct us toward sharply turning the economy toward the intensive path of development. A certain role here is played by intensification of labor and more efficient utilization of it.

Is the enterprise planning measures for intensification of labor? For an answer to this question we shall evaluate the planning practice from the standpoint of how the shortage of workers (in percentage of the planned number) affects the planning of the rates of increase in labor productivity. Average annual planning indicators for the increase in labor productivity for the 11th Five-Year Plan are drawn up on an average for industrial enterprises of Barnaul with 4.5 percent, Biysk--2.8 percent and on the whole for the two cities--3.8 percent of the limit. And for enterprises where the shortage of workers is estimated at more than 2 percent of the limit the increase is planned on an average for Barnaul at 4.3 percent, Biysk--2.6 percent and for the two cities--3.5 percent, that is, less than for industry as a whole. As we can see, the shortage of labor force does not stimulate planning higher rates of growth of labor productivity.

The managers do not exhibit any special desire to economize on the labor force. Moreover, the management function forces them to create a "reserve" of workers. The construction and agricultural "watch" of industrial enterprises was customary. At one-fourth of the enterprises that were investigated, "superfluous" workers performing work that was out of the profile of the production comprised up to 2.3 percent of the overall number of personnel.

For the sake of fulfillment of the production program the managers are oriented primarily toward local interests, which sometimes contradict the interests of other enterprises and the region as a whole. At the same time the majority of them clearly understand that this approach reduces the overall effectiveness of the utilization of labor resources, and they have made a number of suggestions which could contribute to coordinating the interests.

All these suggestions could be combined into four groups:

strengthening centralized management of the labor force in the city (improvement of the work of bureaus for labor placement and information of the population, expansion of the sphere of their activity, rights and responsibility);

a coordinated struggle everywhere against drifters and violators of labor discipline;

improvement of wages (equal payment for equal labor in various branches);

radical measures for eliminating the shortage of labor force.

They are related, in the first place, to the limitation of the construction of new enterprises and the coordination of the number of new work positions with the existing possibilities of the population. In the second place, this includes strengthening planning discipline, particularly observance of the limits on the number of workers and employees and, in the third place, a higher standard of living for the population of the region, which will contribute to reducing the outflow of skilled personnel.

Underestimation of one's own capabilities.

A survey of the suggestions for coordination of local and businesswide interests in the area of the utilization of labor force shows that they have various "address," that they pertain to various aspects of the socioeconomic situation and that they can be realized at various levels of management. But the managers see the fewest reserves for improvement directly at the level of management of the enterprise. Thus in the questionnaires they did not mention such measures as restructuring the management of the labor force at the enterprise, intensification of labor which leads to large-scale release of labor force, although these are precisely the things that contribute to eliminating the shortage and establishing a correspondence between the available labor force and the needs of production. Unfortunately, there have been numerous attempts at mobilizing the intensive factors. During the year of the investigation (1982), brigade organization of labor with payment for the unified contract at the enterprises that were investigated embraced only one-third of the workers. Yet, in the opinion of the managers themselves, at 76 percent of the enterprises this would have led to increased labor discipline, at 64 percent--to increased labor productivity, at 71 percent--to increased wages and at 43 percent--to a reduction of labor turnover. Nonetheless the brigade form has not been disseminated satisfactorily, and only the decree of the CPSU Central Committee, the USSR Council of Ministers

and the AUCCTU concerning its further development and increased effectiveness, adopted at the end of 1983, gave it a new impetus.

Another example. At enterprises where measures have been taken to increase the interest of the labor collectives in accelerating the increase in labor productivity as envisioned by the decree of the CPSU Central Committee and the USSR Council of Ministers of 12 July 1979, the proportions of various measures differ extremely. Thus at 90 percent of the enterprises the workers are paid increments to their wage rates for combining occupations and fulfilling the established volume of work with fewer workers, in an amount up to 50 percent of the wage rate (salary); but at only 31 percent of the enterprises have they established increments for skilled workers who are employed in especially responsible work, and for high professional mastery; at 73 percent of the enterprises they use increments for engineering and technical personnel and foremen, and also employees for high qualifications, in the amount of up to 30 percent, and for designers and technologists--up to 50 percent of the salaries; at only 54 percent of the enterprises have they taken advantage of the right to pay the workers for initiatives for introduction technically substantiated norms and prompt revision of them with a one-time remuneration from the savings received as a result of the revision of these norms.

Thus results of our questionnaire show the inadequate utilization by the enterprises themselves of the possibilities of increasing labor productivity.

Not all of the managers of enterprises have understood the importance of this critical moment in the development of the Soviet economy--the changeover to the intensive path. As before, they have relied on increasing expenditures of material, financial and labor resources. In their activity the managers do not sufficiently utilize social factors in effectiveness and they far from always recognize that intensification of production can be achieved not only as a result of industrial capital investments, but also because of investments in the social and domestic infrastructure. The management of the economic units has not always consistently followed a course toward improvement of distribution relations or the creation of organization and payment for labor which would elicit in the workers a material interest in a high labor return.

Of course many decisive steps for changing the economy over to mainly an intensive path will be taken at the level of the ministries, at the level of government decisions. But the deepest and most substantiated decisions of the higher echelons of management can be realized only when the basic economic units are ready--the industrial enterprises and their managers. And it is here that one finds no small reserve and an extensive field for work with personnel.

The investigation we conducted, the evaluations of the production and social situation, and the figures from the group of directors, it seems to us, provide interesting material for thinking about the readiness of the existing contingent of managers for extensive economic maneuvering and experiments which will face us on the path of intensification of public production. The 11th Five-Year Plan is coming to a close and the new questionnaire will enable us to reveal the changes which will inevitably take place as a result of the restructuring that has been earmarked.

FOOTNOTES

1. Mishchenko, V. T., "The Course Toward Better Utilization," EKO, No 3, 1982.
2. PRAVDA, 3 March 1984.

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FOREMAN MAKES FIRST IMPRESSION

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 2, Feb 85 pp 103-112

[Article by D. P. Kuzmitskas, candidate of economic sciences, Institute for Increasing Qualifications of Specialists of the National Economy of the Lithuanian SSR, and V. A. Skripov, sociologist (Vilnius): "The Foreman Has Arrived at the Plant"]

[Text] A foreman's first working day is especially important. And not simply because, as they say, "a person is judged by what he wears." It is important what baggage he brings with him, where he begins. Will he be able to find a reliable path with his first steps, one which will bind him to the collective? Will he be able to adapt painlessly and quickly? Will he be satisfied with his occupation and the results of his labor? If this does not take place from the very beginning, it will be difficult later to overcome the inertia in his behavior.

This topic is discussed by a former production manager and plant sociologist. Domentianas Pavlovich Kuzmitskas was in charge of a large shop and a plant for many years, and now he teaches in the Vilnius Institute for Increasing Qualifications of Specialists of the National Economy; Vladimir Aleksandrovich Skripov is a senior sociologist at one of the enterprises of Vilnius with more than 10 years of experience at his job. This "duo" makes it possible for the authors to draw a number of generalizations which are based on actual practical experience.

V. A. Skripov: The foreman is respectfully called the "sergeant of production," emphasizing his special role in management. And it is indeed unique. While at other stages of line management the administrative team is refined and concretized in its own, as it were, "ideal" embodiment (paper, verbal transmission), at the level of the foreman, the immediate organizer of the production process, it begins to become more specific again. For the foreman is not simply a relay link in the last level; he is called upon to combine into a single unit the diverse informational and material resources

which are provided by dozens of representatives of the plant administrative staff.

The foreman more than any other manager realizes his management functions almost exclusively in the form of personal contact with the workers. The work of the foreman requires a special art of communication, on which the effectiveness of the entire system of management of the enterprise depends to a decisive degree.

In the psychology of management problems of administrative interaction between the manager and the subordinate have been developed extremely superficially so far. We have outlined only the main issues on which research has been started: the style of management, the influence of "feedback" in operational social management, methods of administrative influence (including those such as reprimand, enthusiasm, imitation and so forth). This is why there is a great deal of interest in the experience of managers in practice as an object of generalization and theoretical interpretation. Let us think about how in an actual production situation a new foreman is to be hired for a job, what are his first steps in the shop, and what should be the role of the shop chief? I know that you have something to recall from former experience as a work manager.

D. P. Kuzmitskas: The foreman is indeed a figure of special importance. I would even say that the success of the managers of a higher rank--the shop chief and the director of the enterprise--depends to a certain degree on their awareness of this importance and their ability to raise the prestige of the foreman to a level that is adequate to his key role in the management of the production collective. I emphasize: not machine tools and not supply, but precisely the collective.

How much time does a shop chief usually devote to conversation with a new candidate for a vacant position of foreman? I asked this question once of my students, shop chiefs, in the Institute for Increasing Qualifications. Some said a half hour, others said in about an hour, and only a few indicated any more time. What do you talk about? What do you mean, what do we talk about? About his previous job, about his salary, about his duties, about our requirements of him. Notice: "About our requirements."

I think that considerably more time and attention should be devoted to getting to know the foreman, regardless of how busy the shop chief may be. Usually I have spent 6-8 hours on this in at least two meetings. And the way the issues were formulated was in principle different. It turned out that it was not a matter of whether or not the worker suited us but, on the contrary, whether or not we satisfy his conditions.

What is the limitation of the "consumer" approach when selecting personnel? That sometimes emphasis is placed on a unilateral interest, and regardless of how high the "state" interests with which one may be motivated, he deliberately fails to provide a productive personnel policy because he proceeds from a position which allows him to see only the "advantage" of one side. An individual with his own personal qualities and motivations is not perceived in his totality, but only in terms of individual parameters which we

are inclined either to conceal or embellish. His actual interests affect us to the extent that they coincide with the requirements which, moreover, are far from always really rational. In this situation they try with all their might to "entice" a worker to the enterprise, even going so far as to make promises which they know they cannot carry out, thus causing tomorrow's turnover even in the stage of hiring.

To put the question another way, we are achieving considerably more useful results, regardless of the level at which we evaluate them. Rejecting motives of selecting the place of work, we proceed from an understanding of the social functions of the enterprise which are reflected, in the provision of conditions for the individual to receive occupational orientation in keeping with his abilities and requirements. This position is also advantageous from the utilitarian-pragmatic point of view, since a partial weeding out of personnel in the stage of hiring is more than "recouped" by the strengthening of the personnel backbone as a whole.

It once happened that a foreman needed an apartment and we were not able to provide one in the near future. We described the actual situation without creating any illusions. Moreover I advised him of which enterprise to go to in order for more favorable chances. And here is what was curious: many of them come back after a certain amount of time. The housing conditions in the region are more or less similar. But now one can be confident that the worker has seriously evaluated the situation and will not leave.

V. A. Skripov: I should like to emphasize that you have expressed a judgment which is not simply an "everyday confession," which can be heard and also can be ignored, for it is not "scientifically proven." We are speaking about a conceptually justified position which is reflected in the theory and methodological practice of personnel management. It is precisely from these ideas that the authors of the Perm system of personnel stabilization proceeded. This system has been recognized not only in the branch, but also outside it. It has been written about repeatedly, including in EKO, and therefore there is no need to discuss it again. It is appropriate, however, to note that the innovation of the method proposed by the Perm researchers can be expressed in the formula: "Turnover begins with hiring."

D. P. Kuzmitskas: Exactly right. To find the individual's basic goal in life and to see whether or not he will be able to move toward achieving it while working in the given position and at the given workstation--this is the task we must set for ourselves when hiring people for work. Not everyone is capable of answering these questions clearly and frankly, and therefore it is necessary to display both patience and tact. But only by becoming convinced that the occupation selected by the individual is correct can one make a decision about hiring him.

And now I have tried to convince the worker that we are the ones who have the most favorable conditions for his future career. There are weighty arguments for this since the shop has accumulated a good deal of experience in the utilization of advanced systems of management work and has good labor traditions which provide talented and conscientious workers with high social and professional mobility. I have discussed, for example, the fact that all

of our engineering and technical personnel are actively studying. Each Wednesday there are group studies in which papers are given, in keeping with a previously established program, on crucial subjects by one of the colleagues (the requirements here were extremely serious, presupposing independent work on primary sources, familiarity with the latest literature, calculations and experiments). All the subjects were selected in such a way that they would necessarily be able to be used in practice on the scale of the shop. This condition turned our studies into not simply learning courses, but also business conferences with collective discussion of the efficiency proposals that were made. It is therefore not surprising that many managers of high rank grew out of the shop foremen.

It is necessary to arrange the conversation in such a way that the worker himself asks as many questions as possible. And if certain questions are omitted because of their delicate nature (for instance, questions about wages or the characteristics of the people with whom it will be necessary to work), one must provide answers to them anyway without fail. For example, I have always had at hand information about all engineering and technical personnel which has been accumulated over several years and which I can use to illustrate how wages increase for those foremen who successfully carry out their duties.

The conversations usually end with a request that the new manager think about how he intends to begin his first working day. Let him sketch out a small plan which we shall discuss together at our next meeting. I have also asked: what he would like me as the shop chief to say when I present him to the collective? And will he say something of his own? Probably only a couple of words? If the speech will be brief it would be a good idea to write it down. At the very end I always said that if he had not thought of anything to say or did not consider it expedient to write anything down that he should come anyway.

V. A. Skripov: I can already hear the voices of the skeptics from among the production managers: when can such a shop chief have time for the plan when he spends whole days talking with a new worker? It is surprising how well he has everything arranged! And will he not completely scare the person away with all these detailed conversations?

D. P. Kuzmitskas: I have frequently had occasion to hear such objections. The famous thesis "personnel decide everything," with all of its apparent obviousness, unfortunately, is fully recognized in practice by far from all managers. Among the production workers, especially line managers, they frequently respect the image of some kind of "stern" technician who is always absorbed in current affairs regarding the fulfillment of the plan and who never has any time for such "lyrical" questions as educational work with people. When I was young I too belonged to that category, and it was only with years and with experience that I came to the conviction (a conviction based on results that have been achieved) that the art of management consists above all in the ability to select, place and motivate subordinates to work. Then I will not need even one one-hundredth of the effort which my opponent expends, without any special success, as a rule. As for the second doubt, I should note: I do not recall an instance when the person with whom I held the

conversation did not appear at the next meeting (with the exception of those whom I myself advised to look for another position which was more suitable for them). For is attention to the individual's plans and capabilities not the best proof that he has come into a serious collective and that he is not a random individual in it?

V. A. Skripov: You mean that the first conversation is a stage on the basis of which you formulate a principle decision concerning the hiring of a new foreman. But what happens at the second meeting....

D. P. Kuzmitskas: The purpose of the second meeting is for both parties not so much informational as instructional: to prepare the foreman for entering his job and to prevent him from making gross mistakes. My experience shows that newcomers do not keep up with the assignment well. Most frequently they have presented their own tasks at the level of repeating the points of the official instructions. Only a few have demonstrated a comprehensive and, the main thing, a concrete view of their future activity. The task of the shop chief is to clarify how the foreman specifically understands the content of his functions. Let us say that he enumerates: "The task of the foreman is to provide for fulfillment of the plan; to check on the work of his subordinates, and so forth." One must ask: "And what does this mean in practice? How is this expressed concretely?"

The meticulousness of the questioning is quite justified in this case. It makes it possible to clarify the issues on which he is weak and where he should be given more training, to prevent him from making mistakes, and to advise him how best to establish himself in the new position. For the first impression is very strong. In a hiring situation, when an individual needs assuring suggestions, they remain in his consciousness better than when he has already had to correct a situation and a defensive reaction appears. Here are a number of basic rules which I have tried to instill in those with whom I spoke:

avoid a command tone. Recall that each worker knows his own duties and has carried them out before you arrived;

address him with the formula: "How can I help you?" Then there will be less probability that you will receive a negative answer;

if you have promised to work out some issue, do not put it off and do not forget. If you do not know go to your colleagues or to your superior, but do not leave him without an answer if you want to be respected;

teach people to come to you as the immediate supervisor with all problems. In your section you are the fully authorized chief and all responsibility lies on your shoulders.

V. A. Skripov: Unfortunately, this subordination is frequently violated by the foremen themselves. One encounters the type of manager who tries to win authority by mixing in with his subordinates. This is the pose of the "little person." When you go to him with a more or less difficult question you hear the answer: "Brothers, well what can I do. After all, I am the lowest rung

on the service ladder!" And he begins to speak about the division of his section among various levels and he blames everything on the management. He is guided by the illusion that acting like one of the boys evokes sympathy and relieves him of responsibility. But this is a delusion. As a rule, this kind of manager quickly loses his authority, even if in his communication he has achieved the desired "neuroimpulsiveness." In reality the result is always negative. If the foreman does not manage the collective, the collective manages him (instead of him or in spite of him). It is good when the collective is mature, with established moral traditions: then there simply arises the question of whether the foreman is suited for his job. It is worse when this kind of style leads to an eroding of ties within the collective and the prevalence of "self-seeking" consumerist tendencies.

D. P. Kuzmitskas: This kind of foreman's chances are especially small in a section which has brigades. We had them long before people began to talk about them everywhere. We arrived at the fact that they were necessary by ourselves, without prompting. When there is a brigade leader, the foreman who does not have his own solid position and does not know the prospects simply becomes superfluous.

B. A. Skripov: The changeover to the brigade form of labor organization could not but be reflected in the position of the foreman. This is quite natural. For with the appearance of a new managerial unit--the brigade leader--there was inevitably some kind of redistribution of labor expenditures among the individual functions. The figures from sociological questionnaires at our enterprise, for example, showed that basically there was an essential reduction of the concerns of the foreman in operational planning and control of the production process, but they increased in long-range planning and in solving organizational problems. Moreover, for some of the foremen the overall load not only did not decrease, but even increased since the brigade began to make greater demands. But this is not all there is to it. The very concept of the foreman changes in the minds of the workers. While previously he was the only manager to whom the worker could turn with questions in a daily situation, now he has a "competitor." There have been, for example, situations in which the brigade leader has morally judged cases in which individual members of the brigade have gone to the foreman with questions of a personal nature, bypassing the brigade leader. Certain foremen have noticed an increased distance between them and the collective. Have you noticed these changes too?

D. P. Kuzmitskas: Undoubtedly, under the conditions of brigade organization of labor the work of the foreman has its specific features. The task of the shop chief consists in achieving full mutual understanding and cooperation between the foremen and the brigade leaders from the very beginning. I wish to discuss the final phase of the second conversation in which the foreman gets to know the brigade leaders. We have agreed with the foremen on a simple device: during the process of getting acquainted I asked him to leave for a little while, after which I asked the brigade leaders: "Well, what do you think? Will he do?" The answer, naturally, was in the affirmative. In the first place, I played on their sense of self-importance; in the second place, they knew from experience that before calling them in I had carefully studied the individual and, in the third place, they had no reason to think badly

about a person they had seen for the first time. But their agreement gave me cause to express the hope that the brigade leaders would help the new manager in getting settled and would support him in forming good relations with the workers. Thus a favorable psychological atmosphere was provided during the period of adaptation.

V. A. Skripov: But have there been cases in which the foremen still did not get along in his new position?

D. P. Kuzmitskas: I remember cases like that. They were discharged, of course, but for other reasons: a change in their place of residence, their health, advancement and so forth.

When I am asked what is the secret of the success of the work of a foreman I answer simply: providing him with a balance of rights and responsibilities which create the necessary prerequisites for the development of a high sense of responsibility. Unfortunately, it is precisely in the work of the foreman that this balance is frequently violated: there are too many duties and almost no rights at all.

Through what is this balance formed in our shop? First and foremost, through clear-cut personal assignment of resources. Do you know how we transfer a section to a new foreman from the predecessor? By a document! We developed a special document which began with approximately the following words: "Foreman I. Transfers to foreman M the section in the following condition...." And several sections followed. The first section, "Personnel," contained information about the number of workers in the collective (planned and actual), the skills required for the work and the workers, the party membership, the length of service and labor turnover and the labor turnover, like the majority of indicators, had been calculated for the preceding year and for the various months of the last year. Then there were indicators of the sections entitled "Production Activity" (fulfillment of the plan, average output, expenditure of wage fund, rhythm, product quality and so forth), "technical supply" (a detailed description of equipment, fittings, and instruments, and attention was devoted to their completeness and technical condition). In the section entitled "Social Activity" we registered the number of cases of revision of norms on the initiative of the workers, their participation in socialist competition and the success that was achieved, accounting (with the coefficient of success) and efficiency work. In an individual section we gave a description of the system of planning and training with a detailed list of existing documents. During the transfer we tried not to leave out a single trivial thing that may have escaped the attention of the foreman for the task was to give an absolutely precise and objective picture of the business that was being turned over for his management.

I know from experience that this document has immense educational significance. In the first place, from his first steps the foreman is convinced that he is entering into cost-accounting relations, and complete and reliable information about the existing resources makes it impossible later to blame "unnoticed" defects in what he inherited from his predecessors.

In the second place, he is convinced that the result of his future work will be registered with equal detail and objectivity and will be compared with what he inherited so that it will be known if the indicators he has achieved are worse than the ones he inherited.

And I have tried to observe this principle of open distribution of resources, assignments and duties everywhere. For example, the monthly plan is turned over to the foreman only after he has certified with his signature that he has agreed to it. Previously it was necessary to prove this to him.

V. A. Skripov: But what if the plan turned out to be unbalanced for the shop? This happens, after all, and not so rarely. Let us assume that the wage fund does not correspond to the volume of output.

D. P. Kuzmitskas: In these cases I have explained the situation and shown that the shortage will be divided proportionally among the foremen (each receives the same percentage of the complete supply). If there is an adjustment this percentage is increased equally for all. But if there has been no adjustment and the foreman has allowed an overexpenditure by the amount of the imbalance, this is not reflected on his record. I think that in these cases the shop chief should take all of the responsibility.

And one more important remark which I should like to discuss: the assertion of the principle of one-man management of the foreman in the section. It is necessary in all ways to support him in this status. It has happened that the worker has gone to the shop chief with the request after the foreman has denied it. Let us say that we are speaking about an absence. In this case if I have felt that the foreman has been too harsh or laid it on too thick, I still suggest that the worker return to the foreman, and then I have met with him and if he was wrong, advised him to change his decision. With the proper ingenuity and tact a conflict can almost always be resolved without violating general principles.

V. A. Skripov: The last question, which will more or less sum up our conversation: in terms of what external, as it were, indicator can one evaluate the quality of personnel work with line managers?

D. P. Kuzmitskas: I recall one conversation which took place among experienced workers during a tourist trip. "Why," asked one of them, "does a new foreman work better at first and then drop off after a month or two?" I responded with this suggestion: more likely it is not the foreman who has ceased to work so well, but your requirements on him have increased. Initially you gave him room thinking that he was a newcomer, and then you begin to take him seriously.

And I thought: and they speak about our foremen as if they were somehow unnoticeable. The foreman has been replaced--and nothing has changed! The section operated well and it continues to operate as if it were running

itself. And in this "anonymity" of management one can see a well-adjusted system which provides for a reliable inertia of movement and succession, and this is probably also a manifestation of an advanced art of administration.

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SIGNIFICANCE OF URBANIZATION ANALYZED

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[Article by A. S. Ladinskiy, engineer-architect, winner of the USSR State Prize (Novosibirsk): "The Building Which Is Being Built...By Whom?"--a discussion]

[Text] The author of this article--engineer-architect A. S. Ladinskiy--saw the first stakes driven for the future institutes and residential microrayons of the Novosibirsk Scientific Center. A winner of the USSR State Prize in 1953 for new technology for manufacturing reinforced concrete, he along with Academician M. A. Lavrent'yev accepted each new building of Akademgorodok. For its construction Anatoliy Sergeyevich was awarded the Order of Lenin.

In his article in LITERATURNAYA GAZETA, which anticipated the article by A. S. Ladinskiy, "What To Build? Where To Build It?," M. A. Lavrent'yev wrote: "As the calculation shows, within the next decade it will be necessary to attract to Siberia from the regions of the country with a surplus of labor no less than a million people, and the living conditions should be created for them so that the immigrants will remain in Siberia for a long time, forever, and call this beautiful region their home." More than 10 years have passed, but these lines remain as timely as ever.

Today we shall familiarize the readers with the suggestions of A. S. Ladinskiy concerning the organization of a "second current" of residential housing construction, which might help in solving the housing problem.

In January 1985 the author was 80 years old. He is working to this day, filled with strength and creative activity. The editorial staff hopes that the problems touched upon in a his article will attract the attention of interested organizations and readers.

In the City or the Suburb?

Urbanization--this word rang out proudly 2 or 3 decades ago. To work in the city and to live in the city were the greatest dream of many rural residents, both in our country and abroad. Since that time an industrial revolution has taken place and for more than 200 years there has been growth of industry, growth of the cities and growth of the number of urban population.

They left for the city to make a living and they never returned, leaving the countryside bare, depriving it of working hands and, naturally, depriving it of population growth. Philosophers and writers--opponents of urbanization--compared the city to a gigantic octopus which was absorbing everything, but the proponents praised the giant cities--the creators of a new era for mankind.

The reverse process, which has begun unnoticed in the past 2 decades, only marks a tendency of the return of the urban population to the land. The process, however, has causes which do not submit to systematization.

The saturation of the cities with industrial enterprises and their oversaturation with people have brought about the problem of settlement, which throughout the world is urban problem No 1. The majority of capitals of the world are literally being suffocated from overpopulation. Where can they work, where can they live? Where can pensioners and young children go where even in the greenest cities specialists are waging a desperate battle for each percentage point of fresh air?

Attention is drawn to the fact that in developed capitalist countries the tendency toward acquiring private homes is manifesting itself increasingly clearly. In particular, in France suburban homes have become widespread. People who have completed their labor activity are happy to move into them. In other countries more significant segments of the population live outside the cities.

In recent years in our country too the attraction of the urban population to the land has been sharply manifested. People wait in line to obtain garden plots. Every available clump of land is cultivated very painstakingly by amateur gardeners, orchard growers, "sadists," as they call themselves. Pleasant labor that is within one's capabilities, which also brings quite appreciable results, not only improves the tenor of life and strengthens the health, but also produces a significant increase in the production of vegetables, fruits, berries and even meat products on the scale of the country. We are also experiencing the educational effect--children, as a rule, are enlisted to work on the plot.

But how does one link the charm of suburban life with public production, which is frequently very distant from the place of residence of the city dwellers. Technical progress has its own laws. In spite of all the arguments on the subject "where the development of civilization is leading us," it does not intend to release its positions and concentrate its power in large industrial cities. The city today means the largest associations and firms, VUZes and scientific research institutes, theaters and stadiums, schools and

kindergartens. A large city means hundreds of thousands of residents, and each resident has his own route to work, as a rule, on crowded transportation. And in the evening, returning home by the same route, we end up in an apartment that is filled with noise from the street. Perhaps this is why even the younger generation is experiencing a nostalgic attraction to the land, to the suburb, to the possibility of being alone with one's thoughts in nature, far from the tense life of the large city.

Is it so necessary for everyone who works in a large city to live there as well? Undoubtedly many wish to live as close as possible to their place of work, to the theaters and museums. But perhaps no fewer people wish to live within the proximity of the city, of the place where they work, but still outside the city. Television has brought theaters, concert halls and exhibits close to us. This, of course, is not an altogether adequate replacement, but do we really go there more frequently even if we live in the very center of the city? The development of automobile traffic has made the distances shorter, and the dream of full relaxation at the end of the working day has become a reality.

So far we have been speaking about cities which have already taken form and have their own structure of settlement and their own traditions. But in our country there are also many new cities which are just being created, whose development is related to the assimilation of new industrial regions. Can they not be constructed taking into account the complaints which we make today against the modern overpopulated city?

What Will It Cost Us To Build a House?

In the future each family should be given a separate, spacious, well-arranged apartment with a number of rooms corresponding to the number of members in the family. According to our calculations this will require increasing the annual volume of housing construction 1.5-2-fold. The state does not have the necessary support for this: neither material nor human resources. Hence our proposal concerning the creation of a so-called "second current" of housing construction.

How do we imagine that this will be? The "second current" should be created mainly with funds from the builders and necessarily with their participation in the production of construction materials, parts and in the construction of the building itself. The "second current" should have specific residential buildings which are simpler in design and methods of work and have a complete set of service structures: garages, sheds, basements and, without fail, orchard and garden plots.

Siberia is undoubtedly the most suitable place for conducting this extensive experiment. Not only is it necessary to provide housing for the labor resources that are attracted there, but it is also necessary to essentially improve the conditions for labor and life. The severe climate and the so far inadequately unutilized natural resources are the most typical features of Siberia which must be taken into account when assimilating the new industrial regions. Under the conditions of the severe climate the people spend considerably more time than the residents of the European part of the country do.

The average provision of each individual with overall dwelling space in Western Siberia is 1.5 square meters less, and in Eastern Siberia--2 square meters less than in the European part of the country. The building up of the residential supply in Siberia is also lagging behind the western and southern regions which are better supplied. Among the other problems in improving the well-being of the workers, the housing problem here is the most critical. Its solution will make it possible to attract and retain skilled personnel who are necessary for the more rapid development of the productive forces in this region.

The October (1979) decree of the CPSU Central Committee and the USSR Council of Ministers "On Further Development of Plant Production of Wooden Panel Buildings and Sets of Wooden Parts for Buildings With Walls Made of Local Materials for Rural Housing Construction," is being carried out slowly. It envisions increasing the production of wooden buildings with plant manufacture to 7.1 million square meters by 1985 and to 11 million square meters by 1990. There should be a corresponding increase in the output of sets of wooden parts for residential buildings with walls made of local materials: to 8.5 million square meters in 1985 and 12.2 million square meters in 1990. This a new stage in housing construction and our suggestions are directed toward carrying it out.

The "second current" in the construction of low buildings which are located close to the city limits is a real way of solving the housing problem. Such buildings can become the main housing supply for small cities and suburbs of large industrial centers.

Who wants to live outside a city and work in a plant or factory? This question is removed for many urban residents if each building is given a garden and orchard plot. This is also shown by the numerous questionnaires conducted by the author of this article and that mass inclination toward labor on the land which has been so clearly manifested among urban residents in recent years.

I must stipulate immediately that we do not have in mind single-apartment buildings of the rural type. The construction of such buildings would create new and very serious difficulties. First of all, the heat losses (and this means also the expenditure of fuel) would increase three- to fourfold in them as compared to the same urban apartments. Expenditures on the external network of heating and sewage system and on the construction of boilers and purification systems would increase by approximately the same amount. Nor do we share the conclusions of those people who support multistory buildings in rural areas with gardens and orchards that are crowded outside the suburban settlement. Of course this can be done, but why create artificial difficulties? Moreover we must not forget that the nature of work on the plot near the home and in the suburban plot are quite different. While in the former kinds of plots all family members work a little bit during their free time, in order to cultivate the latter kind it is necessary to sacrifice an entire Saturday and Sunday, transforming days off into a labor obligation for one member of the family who is relieved of other household chores especially for this. Our variant involves a four-apartment garden building. Is it advantageous?

Economic Prerequisites

As early as the beginning of the 1960's the number of apartments being constructed by the population at their own expense with the help of state credit amounted to half of the housing under construction in the country. Now garden homes which are annually being constructed by the population comprise less than one-fifth of all the housing under construction, and in the RSFSR--only 14 percent. The process of sharp reduction of the construction of housing through the forces and with the funds of the population is most marked in places where even without this the housing supply is worse than in other regions of the country. For example, in 1981 in Kursk and Voronezh oblasts 37 percent of the overall amount of housing being constructed annually were buildings constructed with funds from the population, in Krasnodar Kray--40 percent, and in Perm Oblast and Western Siberia--only 10 percent, and in Eastern Siberia, even less--8 percent.

As investigations show, the availability of a garden residential building for the family contributes to retaining personnel to a much greater degree than do increased rayon coefficients, the introduction of additional benefits and so forth. Now Siberia is distinguished by increased migrational mobility. Of the 11 million workers a considerable proportion annually moved to other places. The damage from this kind of migration is quite appreciable.

The changeover to mass construction by the population of low residential buildings with garden and orchard plots and outbuildings for keeping cattle will make it possible to solve several serious problems at the same time. We have already discussed retaining personnel and, moreover, the garden will be a significant aid in supplying the family with products, and the surpluses which will go to the market will improve their well-being and appreciably improve the country's food supply.

Mass construction of garden buildings will also make it possible to solve any social problems such as the organization of active recreation for the workers; the fight against hypodynamism, which medicine today includes among the most significant diseases of civilization; distraction from inactive, drunken leisure time; and the attraction of children from an early age to work on the land, which will play an invaluable role in the system of labor education. At the same time we shall solve the problem of improving the health of the population--both as a result of balanced full-value nutrition and as a result of the positive change in their way of life. Mass construction of four-apartment garden buildings is economically more advantageous than single-apartment buildings, and it is considerably easier to organize construction with the efforts of four families.

Theoreticians of urban construction and architects are strongly against the idea of constructing four-apartment buildings, but those builders who are shown the plans for these buildings and to whom the economic advantages are explained quickly come to favor them. The little garden house should undoubtedly have the full complement of amenities: a heated bathroom with a bathtub and shower with hot water, and well-regulated heating. The first story must have heated floors.

What is so special about our suggestions? We are suggesting constructing a relatively inexpensive building, but with a full set of modern conveniences. The cost of one apartment for the average family in a four-apartment two-story building, taking into account all of the outbuildings and the garden plot will, according to our detailed calculations, be about 10,000-12,000 rubles, and taking into account the private labor of the builders--even less.

We suggest using the four-apartment building as a basis also because it is approximately 30-40 percent less expensive for one family than a single-family apartment building with the same amount of dwelling space, and 15-20 percent less expensive than a two-apartment building. Its heat losses are less and heating it will require five-eighths to five-ninths the amount of fuel that it takes for a single-apartment building and five-sevenths the amount it takes for a two-apartment building. Moreover, the plan we have suggested provides for more complete building up of the territory. Taking into account that five to six-hundredths of land are allotted for the garden or orchard plot, this provides for an average density of the population of 25 people per 1 hectare, which is comparable to the density of population in small cities.

The experience in building buildings of this type convinces us that the two-story apartment is much more convenient than the single-level building. All of the garden buildings, for example, in the Novosibirsk Akademgorodok have also a third level--a basement with a convenient stairway, and some of the buildings also have residential rooms on the mezzanine.

Questions and Answers

As we can see, the problem has become crucial and the practical solutions to these problems have become ready. Let us take a look at what can impede their implementation. The volume of individual housing construction has only decreased in recent years. One of the reasons is the false reference to the shortage of land for the "garden home." It seems to us that this reference is based on a lack of knowledge of the present situation with respect to the utilization of the urban land supply in our country. For example, within Novosibirsk the average density of population is nine people per 1 hectare, in Irkutsk and Kazan--five people, and on the plots where the two-apartment cottages stand surrounded by garden and orchard sections--15 people per 1 hectare. Unsuitable land can be used for building low garden buildings--the slopes of ravines, for example, which are not suitable either for fields or for multistory construction.

The second objective amounts to the notion that individual buildings without hot water, without warm bathrooms and without convenient heating no longer satisfy the people, and mandatory provision of each individual building with a centralized system of heating, water supply and sewerage is costly and metal-intensive. Here they absolutely do not take into account the fact that we know have about 33 cities and 69 villages of an urban type that do not yet have centralized sewage systems and that 43 percent of the population still use stoves for heating up to this very day. Of course, in many cases centralized heating systems are a matter of the not-so-distant future, but in places where this is impossible or for some reason is difficult, one can install in each suburban apartment automatic heating equipment, for example,

the Ugolek-4 which will serve as a kitchen stove and at the same time will maintain automatically given conditions for water heating in the apartment. There are also heating stoves with a large heat capacity which have also been somewhat forgotten, but are convenient to operate. These include stoves made of brick, and prefabricated concrete and reinforced concrete elements. There is no serious problem with manufacturing such stoves today.

One of the promising variants of the solution to the problem, especially for Siberian buildings with inexpensive electric energy, is to change over to electric heating. If one adds to this the heating of water for household needs, the application of all the ordinary household electric appliances and an electric stove, during a year one individual will require 5,000-6,000 kilowatt-hours of electric power.

But for certain regions of Siberia where the climatic conditions are especially difficult, when there is relatively inexpensive electric energy that is obtained from burning the least expensive local fuels, this dream can be transformed into a reality in the next few years--if the electric energy is taken at night, when its consumption drops sharply. Water furnaces with large thermal capacities are needed for this.

In particular, the residential buildings of the garden type which we consider expedient to construct along the BAM could be heated by water furnaces from nighttime electric energy, leaving rock coal or peat as a reserve fuel in the event of an interruption in the power supply or heavy cold spells. And if it becomes possible to obtain heat from a thermal supply line that is passing by and to discharge sewage into a main network, it will be simple and inexpensive to do this without essential changes in the design.

The organization of our proposed "second current" of mass housing construction in Siberia of two-four-apartment buildings of the garden type can lead to a considerable increase in the expenditure of fuel which is even now in short supply. But the "antidote" is well known to architects and builders--it is necessary to increase the insulating properties of the walls and the upper coverings 1.5-2-fold as compared to those that are ordinarily used today.

One more quite important issue which must be solved in order to develop the "second current" of housing construction is fecal sewage. The sewage system for industrial and household wastes in the country now leave something to be desired. The cost of the structures for biological purification of sewage waters is very high. And all the construction of purification installations for sewage from industrial enterprises and cities is being carried out throughout the country on a significant scale, it would be self-delusion to count on having the problems solved in the next few years.

But is it really necessary to wait until all of these problems are solved before finally beginning mass construction of the "second current" of housing? Is it necessary to have a centralized sewage system which is suitable for cities and large industrial enterprises in order to carry out our suggestions? We consider this to be not only a costly extravagance, but also a loss of an immense quantity of water resources and value chemical substances which can be used for fertilizing the land. A possible variant is a cesspool near the

building which, when properly organized with ventilation through a heated channel does not produce any odor in the apartment. The so-called air closets are used extensively in Europe and America. From the household sewage system they lay a perforated asbestos cement pipe from underground irrigation which is sunk to about 1.0-1.2 meters, through which they irrigate and fertilize the garden plot at the same time. The method of underground irrigation in this case is coordinated with sanitary inspection, and it is economical and maintains the normal conditions for life in the rural building.

How Is This Building Done?

The fact that people without construction skills can erect immense shops and complicated engineering structures has been shown by the experience in mass construction during the war and especially during the period of postwar reconstruction of the destroyed cities. Each year student construction detachments erect thousands of buildings and structures, although, as a rule, there are no building specialists among the students.

There is no doubt that it is necessary to have special planning of garden residential buildings with simplified designs which do not require complicated working. Unfortunately, all 284 types of individual buildings recommended for Siberia, which are mainly single-apartment dwellings, do not take into account the fact that they will be constructed by people who will be taking construction tools into their hands for the first time, and moreover these plans are intended for rural areas where engineering systems are available.

The creation in Siberia of a large "second current" of garden housing construction is possible under the condition that the urban resident believes in the advantages of the garden home with well-regulated heating, a warm bathroom and hot and cold water.

It would be expedient even in the next few years to construct models of two- and four-apartment garden buildings with all of the amenities, garages, cellars and sheds. Their construction should be entrusted to the best construction organizations of the oblast so as to have standards for mass independent activities in construction. It will be necessary to exert effort and organize the output of special prefabricated reinforced concrete for the heating devices and cesspools. It would be expedient to develop the blueprints of the buildings with the necessary set of service premises individually for each Siberian oblast, taking into account the existing bases of the construction industry, local resources of construction materials and so forth. Along with wood it is possible to use slag concrete, gas concrete and other kinds of concrete, rush pressboard, "Chernozem binding," porous fissured rock, adobe and other local materials.

We have all the prerequisites for restoring the construction of this type of building even now. Some of the large panels of the "outdated series," those which have defects and are not suitable for multistory construction but are quite acceptable for our purposes can be sent to individual construction sites. With time it will be possible to create specialized sections for casting the garden buildings in a good standard prefabricated metal casing. It will be possible to cast this kind of building almost completely from various types of plastic concrete--the method is quick, inexpensive, and the building is practical and durable.

In the Urals and Siberia they are now actively constructing buildings with walls made of slag concrete, which does not require much cement. Walls made of this are warm and durable.

Gas concrete wall blocks for low buildings are the best and least expensive material, which is being widely used in housing construction in the Scandinavian countries. We also have 20 years of successful experience in using gas concrete blocks in the walls of low buildings in Sovetskiy and Leninskiy rayons of Novosibirsk.

A new and very promising type of low residential building has now appeared in the country. The large panels of the outer walls and attic coverings have a thickness of only 15 centimeters and consist of a light wooden frame with flat wood chip slabs 13-16 centimeters thick glued to both sides. The interior space in the walls is filled in with foam plastic with a volume weight of 50 kilograms per cubic meter. A square meter of this kind of wall weighs no more than 40 kilograms and in terms of its thermal insulation properties this extremely light wall is as good as even the best brick wall, which is 80 centimeters thick. This superior and inexpensive plastic is wood. It is manufactured for commercial use mainly in construction and does not require any complicated or costly additional processing.

The Politburo of the CPSU Central Committee has considered the question of improving the utilization of timber in the main directions for the development of the timber complex under the 12th Five-Year Plan (PRAVDA, 26 November 1983). It is time to put an end to the practice of ignoring timber--one of our best construction materials. In 1950 we felled and shipped 280 million cubic meters of commercial timber. In 1982 we also produced 280 million cubic meters. The proportional decline in the significance of timber in the national economy contradicts the resurrection of timber that is taking place today in the majority of developed countries for more and more varied construction purposes.

And the water reservoirs that are under construction are still flooding valuable timber...

An engineering and economic reference: from 1,000 cubic meters of round timber one can construct no less than 20-25 good apartments, and from 1 million cubic meters of round timber--20,000-25,000 apartments in buildings of the garden type. As calculations show, the annual increase in timber in the country is 800 million cubic meters, and we are felling only half of this. If we increase the annual selling by 12-15 million cubic meters for individual housing construction, each year it will be possible to construct an additional 10 million square meters of dwelling space in addition to the 100 which we now produce in all of our main enterprises of the construction industry.

Here are some lines from an essay by the writer Ye. Vorob'yev, "Man Over the Angara" (Moscow, "Sovetskaya Rossiya," 1981):

"The architects of the hydroelectric project who were living and working in Bratsk had designed for the Kodinskiy Flatland a nice settlement for 1,500 individual lots. The settlement is growing up to the south of the city and

spreading out not far from the shores of the future sea, near the future piers and docks. In Moscow they liked and approved the plan of the Boguchanskiy "India" (standard wooden buildings). But the Krasnoyarsk Division for Construction and Architecture took up arms against the individual settlement. The plan which originated in Bratsk for building up the region on the Kodinskiy flatland with small plots of land in standard buildings was erased from the blueprint and this means also from the Krasnoyarsk land. The plan was considered in the higher organizations in Moscow without this little settlement."

What conclusion was reached by the leaders of the USSR Gosstroy and Glavgozeksperitiza when in the autumn of 1980 they considered the plan for the Boguchanskaya GES? In the conclusion of the essay one reads: "Among the shortcomings of the plan for the settlement in the Kodinskiy flatland is the fact that they ignored the possibilities of organizing individual building which provides for economizing on state capital investments in housing construction and contributes to keeping the personnel in the eastern regions of the country, and so therefore it is necessary to single out in the settlement a separate microrayon for these purposes."

Construction has now been started on this kind of settlement, but the Krasnoyarsk Krayispolkom has unjustifiably limited it to 200 buildings although there were three times this many people who wished to build a home with their own money.

There are the most varied opinions concerning the expediency of individual construction of block buildings in Siberia. Block buildings are just as popular among the population as those hewn from logs. The block buildings constructed in the Novosibirsk Akademgorodok will stand for a long time and they are convenient to live in. Among the people who admire them is Academician M. A. Lavrent'yev who lived for about 20 years in such a building and considered life in it to be more hygienic and convenient than in a brick or concrete building. At the same time residents of the northern areas near the Yenisey and Ob' are dissatisfied with block buildings.

We think that it is not the buildings that are to blame but the fact that in planning they did not take into account the specific requirements for these buildings. Their walls are practically never built from dried wood. The timber dries after it has become a part of the structure. In order for this not to cause damage the plan must envision free settling of the walls. The design diagram for the building with bearing walls made out of round logs or blocks should be the simplest. Such a building must be correctly caulked, and in recent years one cannot find people in the "caulking" profession at the construction sites of Siberia.... And so there are a whole number of technical details like these which must be taken into account in order for a good idea to be realized successfully. All of these technical details can easily be restored from old construction literature, but the complete rejection of plans that have proved themselves in past decades can be explained only by the laziness of the designers and their lack of desire to worry about state money.

We have presented this far from complete list of variants of the organization of the "second current" of housing construction in order to prevent the usual objections to additional development of housing construction which, as a rule, are based on the lack of construction materials.

It is obviously time to prepare suggestions concerning individual and cooperative housing construction in the "second current"--both for small cities of Siberia and for suburbs of large industrial centers. The funds and labor of the builders and the funds and materials of industrial enterprises that are interested in offering housing to their workers and employees, and also the production capacities of construction organizations will be enlisted for this construction.

At the plenum of the Moscow CPSU Obkom in 1983 and the session of the oblast soviet of people's deputies they set the task of reaching by 1986 an annual level of construction of buildings of the garden type in a volume of 400,000 square meters of overall dwelling space a year, which will amount to 80 percent of all the housing that has been introduced in the Moscow area. We think that no less of a percentage of garden residential buildings should be constructed as well, which has considerably more land than the European part of the country does.

Such a solution to the housing problem seems quite justified to us. The residents of large industrial centers are quite ready to move into buildings with garden plots, and architects can give them a "package" of their suggestions so that they can be given differentiated consideration in individual rayons, taking specific features into account. This readiness, it seems to us, should grow into a decision which has legal force and a specific party to implement it.

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ENGINEER RESPONDS TO ARTICLE ON ENGINEERS

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 2, Feb 85 pp 128-130

[Response to the article by S. S. Starshinov, "The Role, Payment and Return From the Engineer," EKO, No 2, 1984, by G. N. Nikitin (Kazan): Confession of an Engineer"]

[Text] S. S. Starshinov's article entitled "The Role, Payment and Return From the Engineer made a great impression on me and caused me to think and even confess, if I may put it that way, because I do not have much time left before I receive my pension....

And so I am an "engineer" (I deliberately put this word in quotation marks) who has worked in the division for about 20 years. I have a diploma but for a long time I have felt that I am more of a pseudoengineer.

A couple of words about myself. I grew up in a working family. My father, a mechanic, instilled in me a love for metal and he hoped that I would become the same kind of skilled worker as he was. After the seventh grade I went to a trade school, after which I began to work successfully at a plant as a lathe operator. The shop management took note of my good work. One day the shop chief called me in and said: "Listen, why do you not go into the eighth grade in night school? You will learn something and you will grow more."

He convinced me. I completed the 10th grade in night school. And again the shop chief called me in and advised me to go and study in the evening division of the institute. I wavered for a long time. I was well aware of how difficult it is to work and go to school at the same time. By this time I had also managed to get married. I consulted with my wife (she was a worker and worked at the same plant as I did), and she was happy and said:

"Of course, after all it is more honorable to be an engineer...."

So I went to continue my studies. Do you remember?--At the beginning of the 1960's this was very fashionable. So I had one more barrier behind me--the institute. In my coat pocket was an engineer's diploma. Most evening students and correspondence students are well aware of how we passed

examinations in those years. The only thing I like to remember now is walking the young ladies and girls home from class.

And so I had a "clean" job. At that time the salaries of engineers were not much more than my earnings in the shop, and I easily moved into my new job.

A year passed, 2, then 5.... Since I had almost no engineering knowledge, and they did not augment it in the division, I finally became apathetic. And here they began more and more to take our brother engineer away for other socially necessary jobs. I began to go out on the street with a broom and shovel, to work at the construction site and in other subsidiary jobs. My salary began to differ more and more from the earnings of my fellow lathe operators. Finally I was even embarrassed to look them in the eye. At every meeting they joked:

"Look, there goes an engineer!..."

This name followed me like a shadow. I could not return to the shop, to the lathe, because I had forgotten the skills of lathe work and I was afraid of more jokes from the workers, but the main thing--I must admit--I had become rather lazy.

There were scandals in the family:

"Look," said my wife bitterly, "how much your former friends are earning--300 to 400 rubles! And you? What kind of wages are you bringing me, engineer? I am a woman and I still earn more than you do!"

In a word, in the end I did not make a good staff worker (and I probably could have been), but I certainly did not become an engineer. Apparently all these years I was occupying an alien position. I understood that people become engineers by vocation, but it was too late.

I completely agree with the word of Comrade K. U. Chernenko at the meeting with the voters to the effect that today it is necessary to reduce the management staff and bring the people closer to the machine tools. That was quite correct. It is necessary to introduce order with engineering personnel as well, which was discussed by S. S. Starshinov in his pointed article. I am singling out two aspects from it.

"Keeping more engineers or, rather, more engineering positions than are actually required aggravates the need for labor force.

"It is necessary to increase the wages for real engineers by reducing the number of pseudoengineers and subsequently placing the latter in other jobs."

I wish to augment S. S. Starnishov's ideas by beginning long ago.

A real engineer who was involved in his work worked with me in the division. He was constantly searching and discovering. Technical ideas just poured out of his head. He would come running out of the technical library--and run into the shop and write something down; sometimes he would be preparing an article

for the central technical journal and sometimes he would be filling out his next application for an invention. In a word, he was really enthusiastic about his work. I envy him. He is a direct person, and he always argued boldly with the management, defending his own ideas, for which he became an undesirable worker. And his salary was less than they gave me, a pseudoengineer. I understand that that is unfair. With his efficiency proposals and inventions that had been introduced into production he had more than justified his salary. But I was eating somebody else's bread. Apparently my conscience persuaded me right before pension age.

For the sake of advantage and fairness I would suggest making a strict delimitation between real engineers and pseudoengineers with the establishment of the corresponding salaries. A real engineer should receive a salary on a level with that of the skilled worker and even more.

How is this done? I do not know an exhaustive formula, but one could begin this way: drop into the BRIZ of the enterprise and discover what technical solutions have been suggested by one engineer or another. It is necessary to take those solutions which were submitted by one or two people and not collective ones which sometimes include 10 authors and more. I was a pseudoauthor of several efficiency proposals. I was included as a pusher.

And so if an engineer (he and he alone) has received an author's certificate for an invention--consider him (the author) a real engineer. There is your measure. Then my comrade about whom I wrote above would long ago have had a salary larger than mine.

Invention is probably not the only measure but if one uses it to come to a decision about an engineering problem, the majority of pseudoengineers will automatically be weeded out.

Well, and where will they go? In my opinion they should be transferred to the position of technicians, that is, one should reach a situation such as the one that existed previously, where there were three to four technicians for every one real engineer.

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RESERVES OF MINERAL RESOURCES EXAMINED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 2, Feb 85 pp 131-147

[Article by Yu. A. Chernegov, doctor of economic sciences, professor, Council for Study of Productive Forces under the USSR Gosplan (Moscow): "Are Minerals Becoming Scarce?"]

[Text] We are legitimately proud of the Soviet mining industry: 26 percent of the world mining products are produced in our country. We not only have a reliable mineral raw material base for the development of the national economy, but we also satisfy a significant proportion of the need for mineral resources of the countries of the socialist community and use some of our mining products for mutually advantageous trade with capitalist and developing countries.

In recent decades the extraction and preparation of mineral raw material and fuel has become appreciably more expensive. Production outlays are increasing not only absolutely, but also relatively in the expenditures of industry. Thus the proportion of extraction of mineral raw material and fuel in capital expenditures in industry has reached 45 percent under the current five-year plan.

The increased production outlays in the extracting branches cannot but disturb us. This unfavorable tendency is usually explained by the exhaustion of minerals in the regions where they are traditionally mined, the shift of mining production to the north and east, the greater depth of extraction, the reduction of the content of useful components in the natural raw material and other circumstances. Not everything, however, is true in these ideas.

But How Is It in Fact?

In spite of widespread opinion, production outlays for the majority of kinds of mineral raw materials in the northern and eastern regions are no higher, and even lower than in the traditional ones. Thus the cost of extracting coal there is only 46 percent of the average union level, extracting copper--44 percent, and processing--27 percent, extracting zinc and lead--83 percent, and their processing--72 percent. This relationship, as figures on newly

constructed enterprises in the coal industry, for example, show, will apparently be retained in the future.

The opinion that the capital-intensiveness of the mining products is greater because of the mining industry to the northeastern direction is widespread. Where did this idea come from?

Methodological Outlays

The explanation gives an analysis of these specific features of the capital investments in the mining industry. The deposits of solid minerals are worked in descending order. The upper surface is prepared for mining first. These jobs take up the initial investments. As the supplies of the upper surface are worked, they prepare the next layer, which presupposes additional capital investments. They do not produce an increase in the production capacities of the enterprise, but only make it possible to maintain it at the level that has been reached. Therefore as the mining work goes deeper, at the existing enterprise the capital-intensiveness of the products increases.

When extracting petroleum and gas the total return from the wells initially increases, and then it begins to decrease. In existing petroleum and gas industries the capital-intensiveness, consequently, also increases.

Capital investments for maintaining the capacity is a peculiarity of the investment process in the mining industry. In the coal and iron ore industry capital expenditures on maintaining the achieved capacity are approximately twice as great as the initial investments. The fact is that the capital investments for maintaining the capacities are made by almost every enterprise, while relatively few new enterprises are being constructed. In 1983 the proportion of new construction projects as compared to existing enterprises in the coal industry amounted to 4 percent, and in the iron ore industry--8 percent.

Because of the lack of figures concerning initial capital expenditures and capital investments on maintaining the achieved level, proportional capital-intensiveness and capital-output ratio are calculated by the usual method for other branches: capital investments (or the increase in fixed capital) are divided by the increase in capacities. And since the capacities of the mining industry are increasing mainly in the north and east, one draws the conclusion that these regional changes are making them more expensive.

It turns out that capital investments basically in assimilated, mainly the western, regions of the country offer increasing capacities that are being introduced mainly in the northern and eastern regions.... The sum, of course, does not change, but the conclusions concerning the effectiveness of the distribution of the mining industry are distorted.

One should also take into account the zonal prices for products of the mining industry. Wholesale prices for the main kinds of minerals and products from initial processing, which were introduced beginning on 1 January 1982, are lower precisely in the north and the east, which reflects the national economic effectiveness of mining production in these regions. So far there

are no unified prices for mineral raw material, which would give a more precise idea about the output-capital ratio in the mining industry for the various regions. And the calculated figures for the coal industry show this.

If one takes the wholesale price of a ton of conventional fuel in the western regions as 100 percent, we receive a relative amount of the wholesale price of coal in the eastern regions of 62.1 percent, including for grade G--67.7 percent, D--82.1, B--131.0, K--85.4, Zh--61.9, OS--46, T--53.7 and A--53.9 percent. Thus for all the grades of coal extracted in both zones (with the exception of grade B), the price of a ton of conventional fuel in the eastern zone is lower than in the western zone. The relative increase in the cost of coal of grade B is determined by the high expenditures in certain remote regions and the so far insignificant participation of the Kansk-Achinsk basin. With the development of the extraction of Kansk-Achinsk coal, the situation will change even with respect to this grade.

Does Deeper Mean More Expensive?

The question of whether or not the depth of mining work influences the technical and economic indicators might seem idle at first glance: it is clear that a depth of 400 meters is not 200 meters. But there is no reason to simplify. The general rule of mining developments is to work the deposits in a descending order, and the greater depths are reached later. The average speed of reaching the depths rarely exceeds 10 meters a year. Therefore it takes a good deal of time to overcome a 100-meter difference in depth, and during the course of this time new technical and technology usually appears, technical re-equipment and reconstruction of the enterprise are carried out, and the effect of the factors that increase costs is compensated for by a reduction of proportional expenditures.

This statement of the problem is confirmed by the practice of many years of operating many deposits of useful minerals in our country and abroad. Thus the deepest mine in the country, the Korkinskiy coal mine, which is reaching the 420-meter mark, has repeatedly been reconstructed with improvement of the technical and economic indicators. And despite the depth of the working, the production cost of a cubic meter which is removed from an open pit mine is 77 kopecks, that is, less than at many pits located in more favorable conditions.

The nature of the change in the technical and economic indicators when mining work becomes deeper at individual enterprises applies differently to various regions and branches. As supplies of minerals are exhausted on one section or another the mining work is halted, and in order to maintain or to increase the extraction, new enterprises are constructed on other sections. Even if the natural conditions at the new sections are on an average worse than at the old ones, initially the conditions are still better than they were for working the preceding mines. Therefore the conditions for extraction in the various regions and branches change much more slowly than they do for individual enterprises, and there is greater latitude for solving the problem of technical-re-equipment.

Here are the data concerning changes during recent years in the average depths of the mining of coal, iron and asbestos ore (tables 1-3). As one can see the

depth of extraction of minerals in the branches is changing very slowly. But in the coal industry, because of the expansion of extraction by the open pit method, it has even decreased during the past year.

Table 1--Change of Average Depth of Coal Extraction
in Ministry of Coal Industry

<u>Years</u>	<u>Average Depth, Meters</u>	<u>In mines</u>		<u>In pits</u>	
		<u>Depth, Meters</u>	<u>Proportion of Overall Extraction, %</u>	<u>Depth, Meters</u>	<u>Proportion of Overall Extraction, %</u>
1970	285	356	74.2	82	25.8
1975	313	409	69.2	96	30.8
1980	327	457	63.2	104	36.8
1983	325	473	59.2	110	40.8

Table 2--Change of Average Depth of Extraction
of Iron Ore, meters

	<u>1970</u>	<u>1975</u>	<u>1980</u>	<u>1975 compared to 1970</u>	<u>1980 compared to 1970</u>
Total	227	233	259	1.03	1.14
Including:					
In mines	526	553	601	1.05	1.09
In quarries	146	164	199	1.12	1.36

Table 3--Change of Average Depth of Pits and Extraction of Asbestos
Ore in Ministry of Construction Materials Industry

	<u>Depth, meters</u>	<u>Extraction, thousand tons</u>	<u>Depth, meters</u>	<u>Extraction, thousand tons</u>	<u>Depth, meters</u>	<u>Extraction, thousand tons</u>
Uralasbest						
Combine No 1-2	96	3,000	110	3,000	120	3,000
Yuzhnyy	172	6,755	176	10,378	185	11,079
Tsentrall'nyy	205	19,392	225	25,258	245	20,958
Kustanayasbest						
Combine	120	3,458	130	10,742	145	10,748
Tuvaasbest						
Combine	120	745	120	1,549	130	2,740
Orenburgasbest						
Combine	--	--	--	--	45	3,223
Total-average	178	33,350	185	50,927	188	51,748

The average depth of extraction of iron ore can also be significantly reduced, but this is impeded by the shortage of technical equipment--polygradient separators. With the beginning of the output of domestic separators it will be possible to begin to mine immense supplies of oxidized iron quartzites

which are near the surface in many deposits. Moreover, the tailings from enriching factories, which contain 22-34 percent iron, will be processed. They are on the surface of the land, that is, at 0 depth. The tailings from enriching factories should be regarded as a deposit of the anthropogenic type, which contain material which is ideally prepared for enrichment (with the appropriate technology, of course).

It is possible to reduce the depth of mining in all branches of the mining industry. We are speaking about methods of so-called repeated working of deposits. The fact is that it begins to make sense to extract those materials from the deposits which were previously considered unsuitable for mining because of technical and economic considerations (unconditioned materials, materials in barrier and technological blocks, interstratal pockets and so forth). With the progress of technical equipment and technology it becomes possible and economically expedient to utilize these.

The significance of repeated working is clear if only from the example of the Karaganda basin. Here on the mine fields and in existing mines there are about 1 billion tons of minerals that were not previously earmarked for mining, that is, more than on the fields that are being worked. Additionally, the minerals that were not previously earmarked for mining lie at depths of 600-800 meters, and the new mines have to go down to 1,000-1,400 meters.

The existing opinion about the reduction of the capacities of the deposits is not always confirmed by analysis. Even in the Donbass in recent years the average capacity of the coal beds that are being worked has increased somewhat. The average capacity of the coal beds in the Ministry of the Coal Industry in 1975 amounted to 1.14 meters, in 1980--1.16 meters, in 1982--1.18 meters, and in 1983--1.16 meters.

The Value of Poor Ores

The reduction of the content of the useful component in ores is also given as one of the reasons for the deterioration of the technical and economic indicators of mining. But the question must be divided into two parts. The first is related to the purely natural factor, and the second--to that activity of people, technical equipment, technology and the organization of production.

Thus data for the Donbass show that the natural ash content of coal has increased insignificantly. The main reason for the sharp increase in the ash content of extracted coals is the operation of many mining faces with the so-called trimming off of surrounding rock because of the imperfection of the technical equipment and also sometimes direct violation of technology. For 10 years now this situation has been promoted by the policy adopted in the coal industry of accounting for the extraction in terms of the mining mass including 10-12 percent of impurities of barren rock from the soil and the roof of the bed. This is the direct result of inefficient activity, to which we must not reconcile ourselves.

As for the content of the youthful component in the ores, this matter seems obvious: when reprocessing poorer raw material the output of commercial

product is less and the expenditures are greater. But this is true only when the technical and technological conditions for processing raw material of an equal quality are all the same. And this should not be done. And, actually, nobody does this.

Ash Content of Coal in UkrSSR Ministry of Coal Industry, %

	<u>1970</u>	<u>1975</u>	<u>1980</u>	<u>1983</u>
Stratified	20.4	21.2	21.9	23.1
In extracted coals				
a) From "mined mass"	23.9	29.11	32.6	35.8
b) Reported	22.1	24.2	26.6	29.0
Dispatched coal				
(after enrichment)	16.9	18.1	19.4	19.6

We know of unique geological interconnections: the lower the content of the basic useful component in the ore, the larger the supplies themselves and thus the relative content of side components in the ore. With such materials one can and should create especially large enterprises and shops for their agglomeration. Here powerful technical equipment, principally new technology and the organization of the management of production are advantageous.

Thus an analysis of the variants of the mapping of 13 iron ore deposits in the Far Eastern region shows: with the reduction of the average content of metal of 20 percent, the supplies of crude ore increase by 90 percent, and the overall quantity increases by 73 percent. The pattern of the growth of supplies being more rapid than the reduction of the content of the useful component is used in calculations when creating enterprises. According to the norms, for example, of technological planning of iron ore enterprises the following rough ratios are established: with a tenfold increase in supplies, the capacity of the enterprise increases fourfold, and the time period of its operation is prolonged 2.5-fold. For all of the existing iron ore enterprises, the average interconnection looks like this: with the reduction of the content of iron in the crude ore from 50 to 20 percent (2.5-fold) the annual capacity of the enterprise increases from 5 to 45 million tons (ninefold). As a result, the factor of reduction is not only the reduction of the proportion of conventionally permanent expenditures, but also the reduction of the annual amortization deductions.

With reduction of the content of the useful component in the ore there is a predictable reduction of the distribution of its qualitative characteristics, which makes the raw material more technological. For example, an analysis of the changes in the qualitative indicators of the supplies of ferrous quartzites at the various levels within the Lebedinskiy mine at KMA reveals that with reduction of the average content of iron by 3 percentage points, the coefficient of the variation decreases from 17 to 10 percent, and the dispersion of the distribution--from 40 to 10 percent. The stability of quality is reflected favorably in the neutralization and enrichment of ores. With a change in the content of the main component in the ore other favorable changes also take place.

For iron ore enterprises, for example, where the basic method of extracting iron in the concentrate is wet magnetic separation, the content of magnetic fractions is important. One can see practically a direct dependency between the iron content and the losses in the tailings from enrichment: with a 40 percent content of iron in the initial ore, 15 percent goes into tailings, and with a 20 percent content--the wastes are 6 percent.

Let us note that in and of itself the content of the useful component far from always plays the major role in the utilization of mineral raw material. Other physical or chemical properties or a combination of them can be more significant. The ores from the Kachkanarskiy deposit with a less than average iron content are suitable for smelting pig iron because of the ease of their enrichment while in other deposits it is expedient to discard rock that has an iron content of 22-24 percent.

With reduction of the average content of the useful component in the mineral raw material the factor of the increase in geological supplies takes form as a factor in improving the technical and economic indicators with concentration of production and improvement of technical equipment and the technology of production. Therefore, in spite of the regular impoverishment of iron ores, the content of metal in the concentrate increases. As a result the technical and economic indicators of the branch not only do not deteriorate, but even improve. Thus iron from relatively poor ferrous quartzites turns out to be considerably less expensive than iron from naturally rich ores. And, conversely, the most expensive iron is smelted from naturally rich ores from underground extraction in the Krivoy Rog basin.

Comprehensive Utilization

The extraction of side components of the organization of comprehensive productions are indispensable conditions for effective utilization of raw material with a low content of the main useful component. Another important law is in operation here: with the reduction of the content of the main component there is a relatively increase in the value of the side components. It is as though the main components and the side components exchange places in terms of significance. Thus for producing aluminum one uses bauxites, nephelines and alunites (listed in the order of reduction of the content of aluminum oxide) as raw materials. According to calculations, when the content of the main component is reduced by half, the content of the side components and the ores increases threefold. The total cost evaluation of the ores with reduced content turns out to be higher than bauxites. The Piklev Clay Combine operates with waste-free technology for comprehensive utilization of nepheline concentrate which in addition to aluminum oxide contains sodium, potassium, silicon, gallium and rubidium. Because of the deep comprehensive processing of raw material, the production cost of aluminum oxide at the combine has decreased during the past 15 years by 37 percent, and side products--by 20 percent. Now the aluminum oxide obtained here from Kola nepheline is the least expensive in the branch: its production cost is approximately 32 percent less than the branch average. Profitability is increasing steadily: at the combine it is equal to 14.0 percent, while the average profitability of the aluminum industry is 9.9 percent.

For comprehensive utilization of raw material it is important to select the appropriate depth of enrichment. The fact is that with respect to the basic component either related or not related. With an improvement in the extraction of the main component the degree of extraction of related components increases, and unrelated ones decreases. The unrelated components that have gone into tailings can be lost and those that have gone into concentrate can be extracted at the next processing (in metallurgy, chemistry and so forth).

As long as comprehensive processing of raw material is not given the proper attention, the goal is to increase the degree of extraction of the basic components. Comprehensive processing of raw material allows a reduction of the degree of extraction in the stage of enrichment so as to gain an advantage in the next processing. This is the situation with the processing of copper ores in which the degree of extraction of copper into the concentrate has decreased, but the comprehensiveness of the utilization of the ores has increased essentially.

Man-Made Supplies

One of the issues that is still disputed is that of irreversible losses of minerals during the course of their extraction and in tailings from enrichment factories. Indeed, technical equipment and technology are producing limited possibilities of economical extraction of minerals from the earth and useful components of them from natural raw material. Let us emphasize: economical extraction. For in principle it is technically possible to sharply reduce losses in many known technologies.

As we know, losses of minerals when they are extracted by the underground method are significant: as a rule, they amount to 20-40 percent, sometimes reaching 60 percent. There is a practically universal method of appreciably reducing losses: marking out the worked space. But this device makes the extraction more expensive, and therefore it is used relatively rarely—when extracting especially valuable kinds of mineral raw material and those which are in short supply.

When minerals are enriched the losses frequently can be reduced by changing the conditions for the operation of the equipment and reducing its productivity. This, unfortunately, reduces the technical and economic indicators of production.

Of course there are many cases in which the losses are brought about by the lack of effective technologies or their imperfection. But new technologies, and sometimes quite unexpected ones, are appearing regularly. We know of examples of repeated working by the open pit method of deposits which were previously worked with underground technology. Supplies which were at one time considered irretrievably lost are now being extracted more effectively than with the special methods of underground extraction.

Working of coal deposits that are in complicated mining and geological conditions by the underground method sometimes means considerable losses of minerals amounting to more than half of the initial supplies. Such losses

amount to hundreds of millions of tons, and all of them are considered irretrievable. There has appeared, however, a technology of underground gasification. Because of the new technology a paradoxical dependency takes form: the more supplies that are lost earlier, the more effective it is now to work them.

The practice of enriching minerals is filled with examples like this. As the technical equipment and technology improve there is a return to repeated processing of tailings from enrichment factories. What was previously lost because of the lack of means of extraction or increased cost, is extracted very effectively under the new conditions.

Progress of Technologies

Current methods of enrichment make it possible, for example, to economically extract from the ores only magnetic fractions of iron. The technologies for extracting weakly magnetic varieties through preliminary roasting are imperfect and too expensive. As a result, 22-24 percent of the iron contained in the processed ores goes into tailings of enriching factories. Moreover, oxidized ores are not used for processing, and the supplies of these are colossal and lie very close to the surface. Frequently these supplies are sent to the dumps along with barren rock.

But technology for enriching iron ores using separators with a strong magnetic field is already on the way. It will transform the tailings from enriching factories into deposits of minerals. Their value is especially great since the raw material has already gone through the stage of crushing and pulverizing--the most expensive of the enriching processes. The new technology will make it possible to process supplies of oxidized ores as well.

The problem of exhaustion of minerals is closely related to the problem of their loss. The fashion for predicting the time periods for working supplies of one mineral or another arose under the influence of the ideas of the so-called "Roman Club." Without discarding the grain of truth in their appeals to utilize mineral raw material economically, one must recall: such predictions have been made repeatedly and each time they have been refuted by scientific and technical progress.

Thus 2,000 years ago in ancient Greece they discussed the prospects of working the "last" deposit of iron ore.¹ Sometime later they addressed the problem of the "iron famine" in ancient Rome. At the beginning of our century at the World Geological Congress one eminent scientist announced that the last gram of iron would be extracted in 1988....

Not even a quarter of a century passed before the ideas about the supplies of iron in the earth were radically changed. And not so much because of newly discovered deposits, but because of the reevaluation of iron ore in ferrous quartzites--these were previously not taken into account. But after the creation of effective technology for processing them they cover a considerable proportion of the need for iron ore raw material.

The examples can be continued. But even now one can draw constructive conclusions: as one kind of raw material which has become traditional is exhausted, new ones are being developed, and this possibility is opened up by new technologies. From the example of the changeover from naturally rich to poor iron ores it is clear that a reduction of the effectiveness of production is certainly not inevitable.

Economizing on energy resources and developing nontraditional sources put off the threat of an energy famine in the indefinite future. But the ideas of replacing traditional mineral and raw material sources with new ones are less known to the public than suggestions concerning the utilization of new sources of energy. This does not mean, however, that there is any paucity of innovations. Among those with the best results are the developments for synthesizing nonmetallic minerals: diamonds, piezo-electric crystal, precious and semiprecious stones, mica, asbestos and amphibolite asbestos.

Even in prewar years Academician A. Ye. Fersman advanced the idea of "creating deposits." He suggested looking for new technologies for the application of minerals that are not extracted or are poorly utilized in production, thus replacing traditional products with new ones.

Thus in the Ukraine they developed the production of basalt fiber. The initial raw material for it is widespread rock--basalt, diabase, amphibolite, hornblendite and others. A modification of this fiber--superfine basalt fibers and threads--effectively replace chrysotile asbestos which is in short supply.

The possibilities of comprehensive utilization of mineral deposits, deep processing of mineral raw material and the creation of composite materials with previously given properties are far from exhausted, and this limits the need for mineral raw material. For example, the organization of production of even 20,000 tons of niobium a year and its utilization as an alloy supplement is equivalent to increasing the smelting of steel by one-third.

The creation of new alloys opens up the possibility of reducing the consumption of mineral raw material. In the table of chemical elements there are 80 metals, and industry uses only about half of them. We have studied the properties of only 25 percent of the possible bimetallic compounds and about 0.25 percent of the trimetallic ones. Compounds made of four and five elements have been studied quite insignificantly.

As the supply of scrap metal increases there will be an increasingly large proportion of metallurgical charges. According to calculations, beginning in approximately 1990 this will lead to a stabilization of the extraction of iron ore, in spite of the increased smelting of steel.

Let us recall, finally, the possibility of geotechnology as predicted by Academician V. I. Vernadskiy, which he understood as the acceleration of geological processes in order to form and restore the deposits of minerals on certain sections of the earth's crust.² In the future new mining technology will open up the prospects for unlimited mineral raw material potential.

When speaking about factors of potential improvement of the economy of the mineral raw material base, one must keep in mind that these are still operating very weakly. The basic reason for the increased cost of mineral raw material and fuel lies in the underutilized possibilities of scientific and technical progress, which is capable of covering the negative effect of natural factors. In mining production there is still a prevalence of traditional technology and technical equipment, and changes pertain mainly to individual indicators. Rapid dissemination of the achievements of scientific and technical progress in production can undoubtedly stabilize and then lead to a reduction of expenditures in the mining industry.

FOOTNOTES

1. Oleynikov, A. N., "V Nedrakh Planety" [In the Bosom of the Planet], Leningrad, "Nedra", 1979, p 71.
2. Recently in scientific and technical literature the term "geotechnology" has been used in a different sense: it means the totality of methods of well extraction of minerals (underground gasification of coal, underground smelting of sulfur, leaching of metals from ore with chemical and biological reagents, and so forth). V. I. Vernadskiy introduced the term earlier, it entered world mining literature and reflects the priority of domestic science.

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EXPERIMENT IN FLECTING MANAGERS RELATED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 2, Feb 85 pp 148-153

[Article by L. P. Podmarkova, junior scientific associate, Institute of the International Workers Movement of the USSR Academy of Sciences (Moscow): "When They Have a Choice"]

[Text] To begin with two facts: at the section for large fittings of the Lvov Elektron Production Association a difficult situation arose. The collective was not fulfilling the plan, labor productivity was low, the workers were complaining about the foreman and they expressed dissatisfaction with the style of management. They wanted to replace the brigade leaders in the section but they could not agree on a single candidate. Then on the advice of sociologists they decided on an experiment: instead of appointments they held elections for the foreman and two brigade leaders.

Things did not change for the better immediately. But reinforced with the confidence of the workers, the managers were able to overcome some negative changes. Relations within the collective became smoother, and gradually a good working attitude came to the shop. Within a year it turned out that labor productivity had almost doubled and earnings had increased by more than 40 percent.

Another example. It is known that the better the adjusters' work, the more leisure time they have: well-adjusted equipment does not break down so often. Taking this into account, at certain enterprises of Minsk in searching for better forms of intraplant cost accounting [khozraschet] they decided to teach the machine tool operators the associated occupation of adjuster--for when the equipment was not in good repair there was nothing for them to work on. The machine tool operators now receive additional payment for combining occupations and a bonus for eliminating breakdowns of equipment, their skills have increased, and they are more satisfied with their labor. Downtime of equipment and labor turnover have decreased and labor productivity has increased.

Both of these cases are remarkable. They show the significant reserves for improving production and increasing its effectiveness that lie in attitude toward labor that is filled with initiative and interest.

The value of all experience has been accumulated in the local management collectives: the brigade contract and work under a single schedule-order. Under the current five-year plan the brigade form should become the basic one in labor organization. Previously brigades were created in those cases when, because of production and technological conditions, one-time participation in labor by a group of workers was required. Each one performed his own operation and his labor was paid for individually, regardless of the overall results. Now the brigade is becoming a socioeconomic unit which collectively controls its own activity. It should be a cost-accounting unit, have a clear-cut plan and work according to a single schedule-order. At the Volga Automotive Plant all of the workers are combined into such brigades, and at the Kaluga Turbine Plant--96 percent of the production workers.

One of the important indicators of the brigade is its self-control. The brigade council (which changes management and feels the responsibility for the common results of their labor) or meeting decide all the main issues--distribution of work, tariffs, norm-setting, the utilization of working time, and sometimes--even questions of collective recreation and behavior in daily life. They bear responsibility for the final results. A building is constructed on time with expenditures in keeping with the estimate, tons of coal mines with expenditures no higher than the planned production cost, and so forth.

The brigade, as a rule, sums up its results each month and earmarks plans for the future. It becomes a school not only of labor, but of management as a whole, discussion and adoption of decisions, a school of responsibility. But only if it operates under conditions of efficient management, stable normatives, well-arranged supply and efficient accounting. And this places high demands on all units of management. It is impossible to improve the situation in one unit while leaving the rest of them unchanged. In places where this is the case the brigades disintegrate or they exist only formally on the registers.

In the Leningrad Krasnogvardeyets Production Association they have calculated that an increase in labor productivity of 35-40 percent is provided through social factors. They are multifaceted: the creation of a healthy psychological climate, correct formation of the collective, and accounting for the interests of various groups of workers. For youth, the prestige of the operations they perform, the possibility of increasing qualifications and the content of the labor are very important. For female collectives it is typical to have high demands on working conditions, shift work and the personality of the manager--his tactfulness and fairness. All this cannot but be taken into account when forming the brigade.

It is important for the election of the brigade council not to be turned into a formal act. For it also turns out to be like this: "Whoever you want as long as it is not me." At the Kiev Automated Machine Tool Plant imeni M. Gorkiy it was noted that many workers kept track of their own work and payment separately. It turned out that people working in the brigade do not trust the council--those comrades whom they themselves have elected. This means that when combining people into brigades they have not prepared them

psychologically and, while working under a single schedule-order, each of them feels himself to be "an individual"....

Good results are produced by the selection of workers in keeping with their psychophysiological data and their mutual compatibility. At certain enterprises they manage to arm themselves with this. At the Moscow Automotive Plant imeni I. A. Likhachev, for example, the brigades are formed taking into account the personal sympathies and desires of the people to work together. At the Lyuberetsy Rug Combine (Moscow Oblast) the brigades are staffed taking into account the psychophysiological characteristics of the workers. They join together people who can work with the same effort and at the same rate. With this kind of selection the possibility of conflicts is reduced to a minimum.

The brigade is one of the units of the collective. The basic cost-accounting unit of the socialist economy is the association or the independent enterprise. As a rule, it produces the final product which is ready for the consumer--the machine tools, the suits, the rolled metal or the candy. And not only in the brigade but in the enterprise as a whole the worker should constantly know, feel and be able to carry out not only his labor, but also his management functions. Otherwise even the best-organized brigades will not comprise a unified collective--the enterprise. Otherwise it will not be an enterprise, but something like "apanage principalities"....

Immediately after the civil war V. I. Lenin wrote: "I think that trusts and enterprises with cost accounting were established mainly so that they themselves would be responsible and completely responsible for the profitable operation of their enterprises."¹ It seems that the realization of this piont under modern conditions consists in that the enterprise itself earns its wage fund, that, in other words, it cannot obtain a single kopeck without a corresponding increase in the final results--the output of products that are ready for the consumer, products which meet the requirements of the standards and technical specifications.

And if we introduce or retain for the plants and factories the channels of stimulation not for the final results, but for immediate results, then we are not strengthening cost accounting and we are not learning to manage effectively. Because under these conditions of operation which are "social security-like," one might say dependent with respect to the society, both the worker and the "master" end up in a bad position. The dependent is dependent: and he wants to take more than he will give....

With cost accounting organization of the work of collectives one should exclude such possibilities of increasing the wage fund as budget allocations and bank loans that are repaid with new loans. Then it will be necessary always to earn the funds for payment for labor, that is, to produce the products that are necessary to the national economy and with expenditures that are no greater than planned. The wages will be higher as productivity increases and the number of workers decreases. The latter are of no small importance with the modern shortage of labor force, and with the present low rate of shift work in industry (less than an average of 1.5 shifts). As for earnings, they should be deposited in the wage fund that is created.

The conditions for cost-accounting responsibility are capable of putting the collective's internal reserves into effect. The enterprise--both the administration and the workers--instead of the frequent "justifications" and requests to reduce the planning assignment (but not the wage fund!) and justifications of their own mistakes by objective factors--the negligence of the suppliers, transportation workers, building subcontractors--which we see today, will devote their efforts and energy primarily toward improving the actual results of their work. Here is where the economic eye of each worker is especially important and valuable. Permanent production conferences, public bureaus of economic analysis, and people's control groups and posts obtain a broad field of activity. They have been created at each enterprise. But in many cases the possibility of obtaining free assistance from the budget, banks, or the ministry or adjusting the plan make it not so necessary to search for reserves, they suppress initiative, and they dull economic incentive.

It is important for every worker to be well-informed about the plans of the enterprise--long-range and current--and about the results of his economic activity, so that each one can participate in the discussion and comparison of the possible variants of the development and improvement of production, so that each one's suggestion will be considered attentively and intelligently. Because it is only on this basis that it is possible to realize the right of the manager-worker, the owner of public production capital to participate in management, to invest in the social economy his hands and mind, spirit and thought. And not only within his own work position, but also within the enterprise and the national economy.

It is extremely important for all workers to be able to obtain exhaustive information about the plans for the development of the enterprise, its reconstruction or its changeover to new kinds of products. Without reliable information it is impossible to evaluate the variants with the goal of selecting what is best and most rational. Why, for example, not take the results of the economic activity beyond the balance commission so that the entire collective will know all of the profit and losses, the reasons for them and the lessons to be drawn from them? And so that the director will have to justify himself not only to the main board, but also to the collective?

It seems that it would be useful to experimentally test the practice of creating councils of associations not only made up of officials, but also of representatives elected by the collective--workers and employees. Or the election of brigade leaders, and section and shop chiefs? Perhaps it would be effective to have permanent meetings of representatives of the workers of associated enterprises. It would hardly be possible to put them off by blaming someone else's--only not their own--mistakes, by assurances that "we will correct things," for here what would be important would be not words, but deeds--the promptness of the deliveries.

When we have inadequate effectiveness, productivity and economy--in many cases it is because of the economically unhealthy indifference of those who work at the machine tools or the drawing board, who organize deliveries or establish the planning assignments. And when we analyze the experience of the brigades

or shops that have sharply increased their return, as a rule we come to the conclusion that they have achieved success because each worker has felt himself to be a true master of production: his interests truly were affected.

FOOTNOTES

1. Lenin, V. I. "Poln. Sobr. Soch." [Complete Collected Works], vol 54, p 150.

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AUTOMATION CHANGES SECRETARIAL WORK

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 2, Feb 85 pp 154-161

[Article by I. V. Serafimova, Institute of the United States and Canada of the USSR Academy of Sciences (Moscow): "The Administrative Secretary Under the Conditions of Automation"]

[Text] American statistics lump secretaries in the same group with typists, stenographers and other office workers. In 1983 it included 15.8 million people, that is, more than 14 percent of the overall number of people employed in the economy. This is one of the most widespread professions. According to estimates of the U.S. Department of Labor, every fifth office employee in the country performs secretarial functions.

For a long time having a secretary was a sign of prestige of certain positions. The secretary had to be on the job all the time, to be able to communicate with visitors and to have an attractive appearance. It was thought that his role in the organization was purely auxiliary and he did not actually participate in management. The volume and significance of mechanical work he performed (typing, stenography, preparation of correspondence and so forth) was greatly exaggerated. Gradually the opinion was formed that the secretary was an "organizational excess" who increases expenditures on maintaining administrative personnel. Therefore when electronic computer equipment appeared in American offices there immediately arose a question: can it not be used to reduce the number of secretaries?

It seemed that a solution had been found. In the private sector and in government institutions centers were created for automated processing of textual information (AOTI) which were equipped with modern office equipment. Dictaphones, automatic typewriters and machines that were blocked with computers (the memories of the latter included the most commonly encountered phrases in business correspondence) considerably reduce the time and expenditures on the preparation of documents. It was suggested that the mechanical functions of the secretaries be transferred to these centers. Some companies completely eliminated this category of employees. All the functions for administrative service in them are performed by the managers themselves: they write letters by hand or on a typewriter, they make copies when necessary, they set meetings, keep dossiers and so forth. Other firms took

more moderate action. In every second case when organizing an AOTI center the number of office personnel decreased. At the same time these centers were processing immense masses of textual information and they expanded and accelerated formal communications in the organization.

Along with the AOTI centers they organized centers for administrative service to which they also assigned the reduced volume of secretarial functions. In these one administrative secretary provides service for several managers and specialists.

The practice of both kinds of model centers was extensively advertised in business and specialized journals. They were actively supported by suppliers of modern office equipment who were interested in the sales market. At the end of the 1970s deliveries, particularly of automated word processing systems,² began to increase at rapid rates (20 percent per year).

Here is only one of the numerous examples given by the American press. Before the introduction of an automated word processing system in a small (56 specialists) advertising agency there were six secretaries. Now this position has completely disappeared from the organizational chart. Of the technical auxiliary personnel there has remained only the courier and the keeper of the archives. The secretarial services were eliminated first in the bookkeeping agency, where auxiliary personnel were replaced by young bookkeepers--college graduates who were familiar with automated word processing systems. Gradually the automation encompassed all the other divisions. As a result, the quality of the correspondence improved, the flow of paper decreased, and overtime work related to text processing completely disappeared. But this kind of streamlining has been noted only in small firms and, as a rule, in the sphere of services.

Further operation of the centers showed that the real effect from their activity turned out to be less than expected. There was always a multitude of organizational and sociopsychological problems which canceled out the technical advantages of these innovations.

For example, in the administrative service centers that simultaneously satisfied the needs of various managers, business contacts inevitably became impersonal and their effectiveness was reduced. One of the largest insurance companies in the United States, Prudential Insurance, in order to improve the quality of administrative services and labor productivity, was forced to take a step backwards and introduce specialization in its AOTI center, that is, it actually returned to the old system of assigning worker of the center to functional subdivisions, but on a new technical basis.

A deeper analysis of the activity of skilled secretaries showed that it was only through them that the managers communicate informally with their subordinates. The higher a manager rises on the service ladder, the more he is separated from the normal social relations and the more important a good, reliable secretary is to him. The latter not only organizes business contacts, but also gives them an emotional overtone, which is strongly reflected in the effectiveness of the ties. The secretary can indirectly both contribute to the job advancement of the manager and his increased authority,

or impede these. American sociologists note that frequently before making their new ideas public the managers share them with their secretaries, thus trying to predict the reaction in the organization as a whole.

But in the centers the rigid formalization of relations between the secretary and the manager "isolated" both parties, the manager was separated from the system of informal relations, and the secretary was deprived of his status and the privileges associated with it. Turnover increased among workers in the centers.

Without an assistant at hand the manager was forced to take on some of the functions of a private secretary, mainly those which required independent decisions of the latter. But the working time of the manager is much more expensive. Therefore one must be concerned about labor productivity of both, and consider them as a unified "management team." The effectiveness of the activity of the organization as a whole depends to a significant degree on the smoothness of its operation and mutual understanding. Excessive streamlining of the work of the secretary alone inevitably reduces the labor productivity of the manager. No less important is the ability of the manager to work correctly with his assistant, to delegate some of his authority to him. Far from all managers are able to do that. In order to teach them, special subjects are introduced in business schools and courses for advanced training. Without waiting to carry out this suggestion, the company Nationwide Insurance itself teaches the new work methods to its managers and secretaries at the same time.

Special research has revealed one more mistake in the approach on which the organization of centers is based. It turned out that secretaries spend only 22 percent of their working time actually processing numerical and textual information, and 35 percent--on the performance of various administrative duties, 25 percent--on errands out of the office, and 18 percent--in idle time and waiting for work.

Four basic groups of secretarial functions were singled out:

administrative service--telephone communications, receiving visitors, copying documents, registering correspondence and so forth);

drawing up the work schedule for the manager and making sure that it is carried out, work with correspondents and other functions that require decisions-making;

functions conditioned by the specific nature of the institution, which are different, say, for a law office, a hospital, a shop and a trade firm, and require of the secretary not only mastery of office procedures, but also special knowledge;

typing, stenography, the ability to use the teletype and other mechanical functions.

In this classification the mechanical functions occupied a similar position. In the United States today there is no shortage of stenographers or typists.

Moreover, the significance of the traditional basic secretarial skills is declining. In 1960 practically all of the secretaries actively used shorthand, in 1970--83 percent, and in 1980--only 45 percent. Previously they had to have a typing speed of 60 words a minute and be able to type for 10 minutes with 100 percent accuracy. Now 45 words a minute is enough, but the requirement for editorial skills has increased sharply for this category of worker.

Certain firms have transferred some of their mechanical functions to specialized subdivisions. Yet the work of the secretaries has changed insignificantly, but the labor productivity has increased. Relieved of large typing jobs the secretary acquires new qualities and his authority is expanded. He participates in the preparation of various reference materials, reports, plans and important documents. He is trusted to write business letters independently. It has been noted that the quality of letters written by skilled secretaries is on the average higher than those that are prepared by the managers themselves. The private secretary is gradually becoming a specialist in administration, making decisions of secondary importance for his boss, and handling certain items of the company budget (most frequently business trip and office expenditures).

Research of one of the leading consulting firms, Booz, Allen and Hamilton showed that a good secretary corresponds to a middle-level manager in terms of his business qualities.

According to the estimate of another consulting company, Quantum Science, even by the middle of the 1980's in the United States there will be a critical shortage of skilled secretaries. The overall need of the American economy for specialists of this profile, in spite of the extensive introduction of computer equipment, is increasing considerably. According to official data of the U.S. Department of Labor, up to 60,000 vacancies for secretarial positions will remain unfilled each year. The main reason, in the opinion of the department, is the inadequate professional training of the applicants for the position and their inability to work in automated offices.

Certain schools and colleges of the United States have introduced a particular specialization--secretarial sciences, which include bookkeeping, office affairs, stenography, typing, psychology and archive work.³ But this knowledge alone is not enough. A modern secretary must be excellently oriented in that sphere where the given firm operates, in the process of administration, and he must be able to use computer equipment. In 1960 60 percent of the secretaries used terminals that were connected to computers or automated word-processing systems, in 1983--75 percent, and in the near future it is expected that all of these work stations will be fully automated with personal computers.

Even now, for example, the construction division of the firm Westinghouse Electric in its staff room in Pittsburgh has replaced all the secretaries' typewriters with personal computers. Now all of the internal documentation exists in unprinted form and goes directly onto the screens of the computers of the managers and secretaries. The computers print out only final documents. Large texts are transmitted to the automated text processing

center. The secretaries have great possibilities of creative activity and take on some of the duties of the boss. In the opinion of American managers, this path promises the companies much greater economic advantages than do centers for AOTI and administrative service.

In order to improve the utilization of computer equipment it is suggested that men be actively recruited for secretarial positions. Now they comprise only 1 percent of the overall number of people employed in this sphere. There is the hope that the situation will change in the near future since, according to data of the U.S. Society of Administrative Services, a skilled secretary receives higher wages than a senior computer operator does (mainly a male occupation). A desire is being expressed to change the title of the profession "secretary" to a more prestigious one, say "office assistant" or "specialist in text processing," which men consider preferable.

What are the prospects for automation? Centers for AOTI will, as before, actively operate in large companies with a large volume of printing work and with good organization of labor. Moreover, it is necessary to take into account that not only managers, but also rank-and-file specialists need the services of the centers. The need for them in administrative service is associated mainly with typing work, but the business contacts are less personalized. This area for the development of the centers also has its problems, for instance, the workers employed in them should be recruited from those professional collectives which they serve, as equal members, and their productivity should be evaluated according to the final results of the operation of the entire subdivision.

Experience shows that automation in and of itself does not solve the problem of labor productivity in management since the administrative staff is not simply a mechanism for adopting rational decisions on the basis of information that comes in, but a complicated social system which is relatively isolated from the production and distribution of products. Improvement of its work requires specific methods and approaches which are based not only on the analysis of the work that is performed, but also on a study of the sociopsychological peculiarities of specific management systems.

According to the estimates of American specialists, automation of administrative and auxiliary functions is in an important stage of development. Right up until recently all efforts in this area have been directed primarily toward streamlining the work of secretaries and office employees. The nature of the functions they perform themselves have remained unchanged, and automation has practically not affected the activity of managers and specialists. Yet increased effectiveness of the labor of these main groups of employees is the only possible criterion for selecting one system or another.

FOOTNOTES

1. Ushanov, Yu. A., Ushanova, A. O., "Automated Preparation of Business Papers in the United States," EKO, No 1, 1980.
2. Ibid.

3. The American Association of Secretaries has calculated that 96 percent of the people who take the examination for the title of professional secretary have a specialized secondary or higher education. Of these 39 percent acquired this specialty in a school, 40 percent completed a 2-year college, and 17 percent completed regular 4-year colleges.

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IMPORTANCE OF COMPUTER DATABANKS DISCUSSED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 2, Feb 85 pp 162-166

[Review by Academician Ye. P. Velikhov, vice president of the USSR Academy of Sciences (Moscow), of the book by L. V. Kokoreva and I. I. Malishinin, "Proyektirovaniye Bankov Danykh" [Designing Databanks], "Nauka", Main Editorial Board for Physical and Mathematical Literature, 1984]

[Text] The president of the USSR Academy of Sciences, Academician A. P. Aleksandrov, writing on the pages of the newspaper IZVESTIYA (18 January 1984) in an article entitled "The Task Until the End of the Century," enumerated several immediate tasks which must be carried out in order to raise our society's productive forces to a qualitatively new level. It is noteworthy that the first to be named was the task of extensive utilization of means of information science, computer equipment and automation in all spheres of activity.

Today at various enterprises, organizations and institutions computers store, search for and process an immense quantity of information. In all branches of the national economy the volume of processed data is increasing geometrically, and it is difficult to imagine these branches functioning without computers.

The basis of the computer system of any specific area is the storage of information, which is called the database. The concepts of "database," "database management system," and "databank" have begun to develop rapidly as directions in the area of data processing systems. Many competent Soviet and foreign specialists consider the appearance of database management systems and data banks to be a revolution in the area of information systems. For example, Charles Bachman figuratively illustrates this idea as follows: "Copernicus gave us a new point of view and presented the principle of celestial mechanics. This point of view provides a basis for understanding what previously seemed to be mysterious paths of movement of the sun and the planets through the heavens. A new principle has appeared in the area of information systems: previously the center was the computer, now it is the database."

Certain results have appeared from the creation of databanks in the area of automated control systems, planning, supply and all possible kinds of

accounting, including accounting for personnel keeping dossiers, accounting in the sphere of services and trade, ticket sales, the issuance of information in airports and railroad stations, library loans, medical, pharmaceutical and other references in various informational and reference services. Databanks are beginning to be developed and function in information computer systems, in systems for secondary processing and interpretation of experimental data, and in reference systems such, for example, as the bank of nuclear data.

But the boom in the area of databanks and the increased interest in their application on the part of specialists of the most varied branches of science, industry and business have led to a situation in which one sometimes observes an excessive increase in these, a kind of fashion. As a result of this they sometimes try to apply databanks in places where there is no need for them, where they are ineffective and where it would be quite adequate to take advantage of the capabilities of the filing system or a specialized system for data management. This is a negative side effect which is brought about by the inadequate knowledge of the specific area in which the databanks are to be used and an inadequate knowledge of the capabilities and aspects of their application and also methods and means of developing complicated modern systems. In this connection there is no doubt about the need for and timeliness of the book by L. V. Kokoreva and I. I. Malashinin, which is devoted to the problem of planning databanks.

What does the problem involve? Selecting or creating a "system of program, language, organizational and technical means that are intended for centralized accumulation and collective utilization of data." One cannot agree with this definition which is given in the book under review. Apparently all one needs to do is to point out the need to develop means of automated programming without a programmer.

Both the scientific and the scientific-technical communities are devoting serious attention to the key problems of machine processing of information. About 10 years ago some of these problems were formulated in the form of the so-called program Kodda--a program for research in the area of databases and banks. With great scope and breadth the crucial problems of computerization of the society were handled in the Japanese plan of research and development in the area of the fifth-generation computers. Of the 26 problems formulated in it, an extremely important if not a primary position was assigned to the creation of data bases for the thinking computer.

The task of designing databanks for computers consists in attracting or, better, recruiting for this work mass group of programming and nonprogramming users. One of the stages in solving the problem is the restructuring of the system of training of specialists in this area and providing them with special literature which is written on a scientific and technical level in a clear language with a clear-cut formulation of the problems and ways of solving them.

The founder of the science of databanks, E. F. Kodd, gives a classical example of this approach to the problem. Abroad there are a number of books on designing databases and banks which combine accessibility of style with profound development of concrete issues. Some of them have been translated

and published in our country. Such names as J. Martin, K. Dait, J. Ulman, J. Habbard, C. Autrey and others, are quite familiar to our readers who are interested in this problem. In domestic literature we still have a shortage of this kind of publication. Because of this the book by L. V. Kokoreva and I. I. Malshinin is of great interest.

The book under review touches on many problems which pertain to the conceptualization and the logical and physical designing of databanks. The book is well-written. The introduction is successful--it briefly formulates the modern problematic of the research and its tendencies.

The book consists of two parts. The first part traces the stages of designing databanks consistently--from the simplest ideas and hypotheses to the construction of algebras:

the representation of objects and the selection of the model for the data;

automatic transformation of data models;

relational designing of the database;

languages for communicating with the database (relational);

the construction of associative (relational) memory of the database.

A great deal of attention is devoted to applying mathematical apparatus to solving various problems of databases, discussing and systematizing the most valuable results that have been obtained in this area and which are important for the development of databank theory, and also practical realization of these results.

With a constant increase in the volume and complexity of databases it becomes more and more important for their structure and content to meet the requirements for information processing that are imposed by specific areas. The information is stored in the database in keeping with a certain model which is created during the process of planning. The model depicted in the database should not only meet the current information needs of the particular area, but it should also maximally provide for the possibility of changing and expanding, that is, it should offer a certain level of independence of the data (physically or logically). The book considers models on which the majority of existing commercial and experimental systems of management of databases are based--relational, network and hierarchical. The most promising relational models and relational methods pass through all of the first part. The presentation is detailed and the examples are carefully selected, giving an integrated picture.

Relational methods in the first part of the book serve as a kind of guide channel for "navigation" through the problematics of the databases. Incidentally, in the practice of planning databases (network) the term "navigation" actually is used.

The second part of the book is a theoretical minimum on databanks. Chapters 6-10 contain a brief, carefully thought-out presentation of the theoretical fundamentals of designing databanks. The authors carry the presentation of the methods of designing databanks up to the construction of the system of the representation of knowledge with the help of semantic networks and frames. The clearness of the presentation is provided through mathematical methods, which make it possible to survey the entire spectrum of problems simply and in the style of computer models.

The book by L. V. Kokoreva and I. I. Malishinin is supplied with an extensive bibliography. The authors have done a large amount of work, having concentrated the materials on problems of designing databanks which had been dispersed through numerous domestic and foreign publications and works from conferences and scientific reports.

On the whole, the book is an important event in the life of scientific and engineering circles who are involved in the theory and practice of designing databanks.

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BOOK ON SOCIAL INFRASTRUCTURE REVIEWED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 2, Feb 85 pp 166-169

[Review by I. I. Kantor, candidate of technical sciences, Moscow Institute of Rail Transport Engineers, of the book "Zheleznyye Dorogi v Tayezhno-Bolotistoy Mestnosti" [Railroads in Marshy Taiga Locations] by G. S. Pereselenkov, Ye. P. Alekseyev, B. I. Solodovnikov, A. Kh. Alidzhanov, N. P. Murovanyy and D. I. Korotchayev, Moscow, "Transport", 1982, 288 pp]

[Text] Railroads play a special role in the economic development of eastern regions of the country. The selection of their routes, the location of the stations, the handling capacity of the lines, and the time periods for construction largely determine the distribution of territorial complexes, their capacities and their rates of development. The book by the Siberian author is devoted to the experience in transportation assimilation of Siberia and the Far East in recent decades. These authors include winners of the USSR State Prize for 1983 who earned it for their development and introduction of progressive technical decisions which provided for accelerated construction of railroads in petroleum and gas regions of Tyumen Oblast. The book discusses a broad range of problems related to the construction of railroads in eastern regions and analyzes the influence of the railroads on the development of productive forces. Special attention has been devoted to the Tyumen-Surgut railroad, the largest in the area, which became a support transportation network for the territory of Western Siberia.

By the time when Surgut was determined as the center of the future petroleum extraction region on the immense territory of Western Siberia there were practically no surface means of transportation that were in operation year-round. With the beginning of the petroleum and gas extraction the cargo flows increase to such a degree that the river fleet, which for a long time had been the main kind of transportation in the region, could not keep up with them; the navigation period is not very long here. The winter tracks which are widely used for delivering cargo as soon as the frosts begin have also ceased to satisfy the intensively growing demands for shipments. Two kinds of roads were in competition: year-round highways and railroads. When comparing the two variants, the authors show that the construction of highways would involve greater difficulties and monetary expenditures.

With the opening of the new deposits of petroleum and gas on the territory of Western Siberia there are roads that need to continue the Tyumen-Surgut line in two directions: one--toward Nikzhnevartovsk and the other--toward Urengoy. The book evaluates the economic effect of constructing railroads on the territory of Western Siberia, through which during the time of temporary operation alone the Ministry of Transport construction has transported more than 20 million tons of cargo. The efficient work of the division for temporary operation of Tyumen'stroypu't' has contributed to early completion of the construction of the Samotlor-Kuybyshev petroleum pipeline. Because of the prompt delivery on the railroad that was under construction the turbine for the Surgutskaya GRES was installed 2 months ahead of schedule. According to data of Sibgiprotrans, expenditures on shipping a million tons of cargo to Surgut on the railroad, which had not yet been put into operation by the Ministry of Railways, were 16-18 million rubles less than the expenditures on transportation on the river with transshipment in the Tyumen, Omsk and Novosibirsk ports. According to the data from Glavtyumenneftgaz were presented in the book, transportation expenditures on the extraction of a ton of petroleum, because of the railroad, are now one-ninth off what they were previously when the cargo was delivered to the north of Tyumen Oblast by the river fleet, along winter tracks and by aircraft.

The book emphasizes that railroads are becoming the key links in the unified transportation system. Thus along with the construction of the Tyumen-Surgut line, in Tobolsk and Surgut they have begun to construct large river ports through which cargoes from the new construction projects have traveled along the Irtysh and Ob' to the places of assimilation of the new petroleum and gas deposits. Another example is the Achinsk-Abalakovo-Maklakovo line which sent the cargo flow of timber along the Yenisey to the northern sea route.

Linking the prospects of railroad construction in Siberia and the Far East to further economic development of the regions, the authors justify the need to continue the railroad to the northeast of Urengoy in order to assimilate the deposits of gas and petroleum in the area between the Taz and Yenisey rivers, and also for the needs of the largest industrial center in the Far North--Norilsk. Along with the task of continuing the Bamovskaya-Tynda-Berkakit line to Yakutsk and then to the seaports in order to assimilate the adjacent territories and the country's northeastern coastline, is very significant for assimilating the natural resources of the Ayano-Mayskiy and Tuguro-Chumikanskiy regions a line which connects the BAM with the Akhotka coast by the shortest distance.

The book notes the shortcomings in the planning and organization of the construction of railroads, which have limited the possibilities of utilizing the new construction sites for the needs of the developing economy of the region. Thus when calculating the handling and shipping capacity of the railroad during the period of temporary operation one should keep in mind that immediately after the tracks are laid national economic cargo travels along the line, and special points with dead ends and unloading areas are necessary for receiving it. These were not included in the plan for the Tyumen-Surgut line, and this led to a situation where the newly constructed railroad could not accept all the cargo that was being to petroleum and gas extraction regions.

Of principal significance not only for the construction of the railroad, but also for servicing the branches of the economy are trackside roads, without which construction work in marshy taiga areas is simply impossible. The experience in construction in Western Siberia showed that they are used by all departments that are conducting any kind of work in the region, and moreover the total flow of their cargo considerably exceeds the shipments for the needs of construction. The trucks hauling pipe with a heavy load on the axle are especially destructive to the traveled part of the road. Considerable forces and funds are required to repair the roads. Therefore the book draws a conclusion concerning the need, when developing technical plans, to envision in the sections for organization of construction expenditures on the maintenance of trackside highways in passable condition, and it suggests shared participation of the interested organizations and the construction of roads, and especially in their maintenance.

The authors correctly note that in marshy taiga localities it is necessary to have a permanent highway along the railroad line. It is needed by the railroad engineers, communications workers and energy engineers who service the structures out in the fields. The book does not give a recommendation of how to coordinate the need for a highway during the time of construction, on the one hand, and during the course of operation of the railroad, on the other. But the conclusion suggests itself: it would be expedient to plan and construct the trackside road in such a way that it will operate effectively both during the construction period and during the time of operation of the railroad.

A separate chapter of the book is devoted to the problem of protecting the environment during the construction of railroads. The authors consider technical solutions which are rational from the standpoint of the protection of nature. These include, in particular, the laying of a communications cable and the establishment of a support power transmission line on the side of the land dam of the railroad, as a result of which the width of the strip that is used will be reduced by 6-8 meters as compared to construction an overhead communications line with supports at the side of the railroad.

There is a heated discussion of how, because of unsolved problems, and not even complicated ones, during the course of research and construction irreparable harm is sometimes caused to nature. Thus the lack of devices to put out sparks that come from the exhaust pipes of all-purpose vehicles leads to fires; as a result of one of these a cedar grove was destroyed near Urengoy. The area of timber that is felled for no purpose near the pits that are envisioned in the plan but are not required for the construction has reached a thousand hectares on the Surgut-Urengoy line.

Attention should be given to the suggestions concerning rational utilization of natural resources during the course of construction. The authors recommend, for example, organizing local processing of noncommercial timber and scrap wood so that it can be used to manufacture wood chip or wood fiber slabs.

The book generalizes the experience in the construction of railroads under the difficult conditions of Siberia and the Far East. It will contribute to effective development of railroads--which are key elements of the infrastructure.

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PHYSICAL EXERCISE IMPORTANT FOR HEALTH

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 2, Feb 85 pp 170-172

[Introduction to following article by V. Ye. Raykhenshteyn, doctor of medical sciences, leader of the course in general physiology and sports physiology of the Novosibirsk branch of the Omsk Institute of Physical Culture: "Sports Without Records"]

[Text] Physical Culture has long been a constituent part of the overall cultural development of man. But civilization, paradoxical as it may be, has created a number of essential obstacles on the path to physical self-improvement.

Limited mobility--hypodynamism--has become almost a natural companion to the very concept of civilization and has become a source of many serious health problems. Hypodynamism is an insidious and merciless enemy whose consequences are not manifested immediately and are far from always reversible. We sadly notice relatively quickly its purely external, "cosmetic" manifestations, but we do not always think about the profound disturbances of the metabolism, and diseases of the heart, blood vessels and lungs that lie behind this.

The main reason is that man's natural motor activity is reduced in modern society because of mechanization of labor and life and the constant need for intellectual self-improvement. Therefore we have no time left to keep ourselves in shape and improve our physical condition.

Sports have frequently replaced our natural motor activity. New problems arise, and it would not be an exaggeration to say that sports are still too far from performing their major function--mass activity. Many people are still frightened by an incorrect idea of the need to "waste valuable time on physical culture and sports, the exhausting nature of the activities themselves, and the complexity and uncontrollability of the basic parameters of the organism. Here, of course, we have a confusion of the ideas of "sports for records" and healthful daily physical loads which do not require many hours or specialized medical supervision.

From this standpoint, the survey offered to the readers of the book by L. E. Morehouse and L. Gross, "Thirty Minutes a Week for Maintaining Physical

Fitness," which presents an accessible system in clear and engaging form, is unusually interesting and useful. The reader must be patient and read the survey through to the end since the proposed system requires thinking and it must be followed completely, "without cuts." There is no point in looking at the end and hurrying to follow the instructions to the lessons more quickly--this will be of no use if you are not able to pay the proper attention to the "long introduction." Actually, this is not an introduction but the first step to a well-thought-out system of exercises which, easy as they may seem to be, require a certain amount of self-exertion and, undoubtedly, will power, but the main thing is consistency.

The clear form of the survey repeats somehow the author's device which reduces the effect of the edification of something that has been heard for a long time, and the noncompulsoriness of the recommendations that are presented. The seriousness and the high qualifications of the authors of the book make the system scientific and useful. "Thirty Minutes a Week" is undoubtedly a journalistic exaggeration, a necessary hyperbole for drawing attention to a very serious problem. Still the proposed set and doses of motor activity actually are not burdensome, not cumbersome, and in combination with intelligent consumption of calories, can provide success to those who have thought seriously about their physical condition. Well, self-monitoring of the basic parameters of blood circulation and respiration, which each person is capable of, needs no recommendation.

While walking the good path, readers, do not forget to verify your success with the mirror, the scales and your sense of yourself.

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BOOK ON PHYSICAL FITNESS REVIEWED

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[Review by N. N. Dombrovskiy, biologist (Alma-Ata) and M. N. Levina, journalist (Novosibirsk) of the book by L. E. Morehouse and L. Gross, "Total Fitness in Thirty Minutes a Week," Granada Publishing Ltd., Mayflower Books Ltd, 1977]

[Text] Has it ever entered your mind, dear reader, that at any moment you can return to yourself or acquire a new excellent physical condition, even if up to this point you have never engaged in physical culture or taken care of your health at all? You doubt this? But still it is true.

We are convinced of this by Lawrence E. Morehouse--a philosopher, physiologist and director of the laboratory of man's physical achievements at the University of California, and Leonard Gross--a journalist. Their book, "Total Fitness in Thirty Minutes a Week," became a No 1 bestseller in 1977. At first glance, the look which the authors immediately give us into the headings of the book could cause disbelief in the careful reader, but if we tell you that Dr Morehouse was especially invited to train American astronauts in his system of maintaining physical condition during a space flight under conditions of weightlessness, then possibly you will be interested in what he offers to such ordinary people as you and me.

How does one achieve excellent physical condition? How does one not only preserve existing physical resources, but also increase them? How, without subjecting oneself to self-punishment, does one get rid of excess weight? How does one achieve all this without turning one's life into an endless and tedious performance of duty, into an obligation which when we neglect it gives us a feeling of guilt and inferiority complex? And all this in 30 minutes a week?!

When beginning their cooperative work the authors decided that they would write a book especially for those who want to live a long, healthy and active life and, as Dr Morehouse put it, "not feel tired as hell at the end of the day." The basic point of the Morehouse method is that it is not at all necessary to work "to exhaustion" in order to retain or acquire excellent physical condition.

"Excellent physical condition is simple," the authors of the book assure us. To do this it is not at all necessary to exercise until one is completely exhausted. It is not necessary to avoid any particular food or drinks and it is not good to think that the goal is impossible in this case. The only thing which you need is a watch with a second hand and the habit of checking your own pulse, that is, the rhythm of your heart contractions, in everything. But before beginning to master the method it will be necessary once and for all to get rid of some widespread myths which are current in the sports world and have successfully conquered us. We do not consider it correct to directly compare "major sports" to those tasks which are pursued by health sports, but it seems to us that even we have been infected by some "myths."

Let us follow the authors and try to orient ourselves in the stream of information and misinformation that accompanies the cult of physical culture. For if you have actually decided to get into shape, you will need the available scientific guidance and not amateur advice which is handed over from mouth to mouth and which the majority of us use when we begin to work independently.

Myth No 1. "Never drink when exercising." In the opinion of the authors there is nothing more erroneous than this assertion. If you feel that you are losing a lot of water you should replace it immediately. The cells of your body simply cannot function normally if they do not have enough water: the muscles will tire quickly and the heart will receive an excessive load.

Myth No. 2. "Sugar increases the energy level." In fact sugar which is eaten before the physical load can cause more harm than good. Too much sugar can never make up for inadequate energy.

Myth No 3. "Before physical activity it is necessary to avoid certain kinds of food." Nothing of the kind. The authors participated in a very interesting experiment. From all the possible literature on nutrition they drew up a "black list" of dishes which are forbidden by specialist before physical exercise. From these dishes they drew up a menu for athletes in a sports camp. To the surprise of the specialists it turned out that the forbidden food had no adverse effect on the health of the sportsmen or on the results of their sports activities.

Myth No 4. "Do not eat before swimming." The authors could not learn the origin of this myth, but they assert that neither history nor science confirms it.

Myth No 5. "A surplus of proteins makes you stronger." It is impossible to store up protein for the future. The human organism, of course, can withstand a great deal. Morehouse tested the majority of ideas on himself, and he also tried to deprive himself of proteins. He and his comrade lived for a month without proteins under the observation of the Harvard Fatigue Laboratory. And what happened. Not until the end of the month did they observe a shortage of vitamin B in the blood. It turns out that our organism has so much protein and fat that there is enough of them to last for a long time, but one should not fast unless there is a special indication for this since long fasting

causes interruptions in the operation of the gastrointestinal tract and severe weakness. Hence the authors came up with the concept of an "extensively varied diet" to which we shall return.

Myth No 6. "It is necessary to sweat thoroughly before physical exercise." Wrong. It is much better to take a cold shower. Changing from absolute rest to a heavy physical load in a short period of time can turn out to be difficult, especially for a person with a weak heart. But if you intend to gradually increase your activity without overexercising, there is no point in working yourself into a sweat. The best clothing for exercise during hot weather is your bare skin. Pleasant cooling down during exercises is not a shortcoming. And if you spend all your energy warming up, there is none left for performing the exercises.

Myth No 7. "Put on a sweater after exercising." There is no point in keeping yourself warm after physical exercises. You will not protect yourself from a cold, and it will not threaten you. It is best to return your body to its normal condition, letting it dry out freely. After this you can put on a sweater so that you do not start shivering.

Myth No 8. "Take a cold shower after a hot one in order to close the pores." If you like to take a cold shower immediately after a hot one you may do that. But if you tolerate this like a stoic, by no means should you do it. You are placing your organism under unnecessary stress.

Myth No 9. "Big muscles make you stronger." This assertion was very popular about 30 years ago. Now we know that inflated muscles are not a sign of physical strength. Everyone would like to make an impression with his external appearance, but this should only be a byproduct of good physical condition. The final goal of the exercises for the nonsportsman is good physical condition, cheerfulness, and the ability to withstand stress and overloading.

The authors draw our attention to the fact that when we are faced with mythical, impossible goals, we are undergoing a fiasco. Instead they offer us their own program of physical training which is based on the theory of normal physiology and a great deal of practical experience. First of all, the authors assert, one must not turn physical culture into a means of self-torture. Such exercises lead to injuries and disenchantment, and nobody needs that. Before you have become familiar with the Morehouse training methods, you must answer a question for yourself:

Why Do You Need Good Physical Health?

Let us assume that your normal living conditions meet your social and psychological demands. Your job completely provides for the well-being of your family. Would it not be better for you if suddenly you were to earn twice as much? Perhaps you would still prefer to devote your free time to your favorite entertainment?

This means that first of all it is necessary to single out your most important goals in life. You may boast to your friends that you can do so many pushups

and this will give you satisfaction. But does the ability to do pushups help you in real life? Excessive training in any kind of particular sport or exercise cannot provide either additional advantages or better health or even preparation for daily life.

The program with which we wish to familiarize you will make it possible, the authors promise, in 30 minutes a week, with the special exercises which are calculated according to the frequency of the pulse, to achieve good physical condition.

Each type of physical exercise develops particular systems of the organism. There are many excellent amateur sports, but long-distance running, for example, does not develop the ability to do short powerful bursts which may be needed in life, and the sprint does not provide one with endurance. For multifaceted development it is necessary have the most varied exercise.

In order to select the assortment of physical exercises, we must be well aware and arrange the program in such a way that it corresponds to our personal goals. If you are physically not strong enough or do not have enough endurance, then your goals should be to restore your complete physical fitness. This complete physical fitness still does not mean absolute health--it means, rather, a basis for restoring the health and any kind of activity. And this is still not training in the sense in which we understand this word, but physical fitness should precede any kind of training. The fitness program is not suitable for a sick person, but a person can begin it immediately after he becomes well.

Health, physical fitness and sports achievements are quite different concepts: you can be healthy without being physically fit and, finally, you can have fairly good results in any kind of sports without being absolutely healthy. One more myth is the widespread opinion that sports can make a person healthy. Denying this thesis, the authors give examples in which sports which were beyond their abilities have made certain sportsmen ill people.

The best variant for each of us is when physical fitness, absolute health and sports successes go hand in hand. The task Morehouse and Gross set for us is to get past the first stage, that is, the achievement of physical fitness.

What do the authors mean by physical fitness? First of all, the development of endurance of the cardiovascular system and flexibility of the local motor system.

And so the basic goal of the book is to teach us to be in good shape, to look and feel well in daily life, so that by the end of the working day we are still active and in a good mood.

In each of our lives there comes a day when we suddenly notice that our shoulders are drooping and our bellies are impudently protruding. One gets the impression that our entire bodies have slumped into the middle. Unpleasant thoughts begin to creep into our mind, for example, that at our last physical examination the doctor told us that we should start being concerned about our heart. Something must be done! This correct idea usually

gives us impetus to force ourselves to take up some kind of regular, currently fashionable method of maintaining the health.

Many of Dr Morehouse's patients, just like many of us, resisted any kind of physical load, including ordinary daily exercises. Then some of them changed their style of life slightly, for example they began to walk upstairs to their apartments instead of taking the elevator. And the results were not slow in manifesting themselves! Having analyzed the reasons, the doctors discovered to their surprise that simply changing the habit of taking the elevator affected their views on life and on their personal situation: they began to smoke less or they stopped altogether, they avoided too much food or poor food, they began to drink less and to sleep better. One intelligent effort caused them to remember other natural and healthful habits as well.

How Does One Determine One's Physical Condition?

Let us assume that you are a very healthy person. You have always been active and in your family it has not been accepted to suffer from every fashionable illness that comes along. You are in good shape. But something happened to you at work and you were away from your desk for a month. By the end of this month you lose about 80 percent of your physical conditioning.

And now let us assume the opposite: You have avoided exercise all your life. In just a month you could raise the level of your physical fitness from almost zero to that same 80 percent.

It seems that some people deliberately avoid being in good shape. They like to be weak and dependent. They like to have people be concerned about them. They are glad to avoid additional duties. Through their stubborn resistance to any kind of activity they reach a point where their organism does in fact become fragile and weak. But we hope that our readers are in a different category and it is only the nature of their work or the conditions of their lives that keep them from being in good shape.

Where Should You Begin?

Take a hard look at your way of life and figure out for yourself to what extent it corresponds to your own ideas about health norms. Here it is not necessary to be a great specialist: common sense will tell you how your life corresponds to the norm. You should look more attentively at your behavior, your work and your home situation and decide which of the factors need changing. The first steps include no exercises:

it is necessary to recognize the importance of physical activity. If you really want something you will find the time for it;

make up a list of kinds of activities that are acceptable to you;

try not to deviate from the schedule you have arranged. It is possible to think of all kinds of justification for not exercising: "This goes against my habits"; "Nobody does this any more"; "People will laugh at me"; "I do not have time"....

All these are excuses of weak people. In order to work effectively it is necessary to be entertained by the program you have compiled for yourself and to love it. And the program should indeed be drawn up especially for you.

A Program for Me Personally

These words should be your directive. You will be working alone and nobody will know about it unless you want them to. The exercises should not contain any kinds of activity which you do not like. After all, for everyone who likes to jog there are probably several thousand of those who dislike this kind of amateur sport. If you are one of these several thousand, for you personally it would be better not to include jogging in your activities. Physical activity is at the same time sensual activity. Therefore when you have to move you should do this on the basis of grace that are inherent in you. The strains should be slow, gradual and not excessive. The exercise should be more like a dance in your favorite rhythm. Your muscles should respond to the sense of bodily well-being which you arouse in yourself with the exercises.

Unfortunately, you have fixed in your mind the type of exercise that is more like a tortuous drill. It is not easy to replace this stereotype in your awareness, and it very much impedes a positive attitude toward physical exercises. But if you work out in your own room and nobody is standing over you, you will not have to look at the second hand in order to "push" yourself. Not the second hand, but the rhythm of your heart will control your individual load and rate of movement.

In the exercises that are suggested henceforth the main goal is to improve and regulate such functions of the organism as strength and endurance. Here there will be no strictly given rate, distance, time, positions or range of movement. Each person will adjust the parameters to his own requirements and even ideas. "Physical drill" looks good on the report, but it is not very useful," the authors think.

When preparing the program for the astronauts Dr. Morehouse came up against attempts on the part of military medics to introduce a strict program of physical training. But the first time the astronauts flatly rejected rigid regulation. It seemed to them that each should work in his own way and train according to an individual program. The arguments which they used are fully acceptable for each of us. But one idea should be strongly planted in your mind: you will absolutely be successful! And, perhaps, do not forget about the widely known truth: to adapt one's organism even to a limited, but necessary load is somewhat more difficult than the sedentary or prone way of life....

An extremely convincingly example of the consequences an inactive existence, which is given by the authors of the book, is the example of the American astronauts. In the first week of space flight they lost 10 percent of their bone tissue, and in the second week the losses reached 15 percent.... The question arose: in general can remain in space for very long? But then it became clear that within 50 days the losses began to be restored. The

astronauts reach a stable physical level. It is lower than the one with which they started, but it is quite adequate for work under specific conditions. Why conditioning for the heart?

No one needs to be convinced any longer that the heart needs exercise. With exercise it receives more oxygen, it becomes bigger and stronger, and it works more effectively. A heart that is in good condition beats more slowly both at rest and during work. It has a greater "pumping" capacity.

There is another argument in favor of conditioning. Special exercises for the entire organism provide the heart with a "secondary" strengthening system. Every one of our muscles is auxiliary for the heart. When the muscles contract they help to transport blood to the heart. If instead of muscles a person has excess fat, he exhausts his heart. Excess deposits means also excess capillaries which the heart must also serve.

Rhythmic, continuous exercise during which the muscles pump by turns are a suitable condensor for the heart. When the blood is pumped out of the muscles it always goes toward the heart. Physiologists call this action "venous return." Muscles participating in this strengthen its effect. Rapid heart beating in and of itself, for example, from agitation, does nothing. The muscles do not have to complete the work, the heart is underloaded and it "idles." This does not mean that it is resting.

From time to time you walk near a table or chair during work, the work itself can only improve because of this. You probably know of the type of people who like to solve mental problems while walking--this produces the impression that they are not serious, but it is not without meaning. True, these people are frequently advised: sit down and think about it well." From the standpoint of normal physiology, this approach to mental work does not seem to have any point. Therefore it is really too bad that the training process requires constantly sitting in one place. It turns out that from childhood the mastery of knowledge is artificially held back, and then the specialist--having been a sedentary school child--the rest of his life makes up for the mistakes of an incorrect school education.

Dr. Morehouse draws the attention of the readers to the fact that all of the cardiologists he knows are always exercising. Regardless of who they are they take their proper physical exercise in order to maintain their heart activity.

In What Measurement Do You Live?

The life process has two measurements. One is the absolute number of days lived, and the other is the completeness of life. If you will exercise you will prolong the number of days lived and there is a guarantee that you will live them with satisfaction and usefulness.

Once a group of physiologists developed a program of physical exercises for managers. In order to be sure of the effect from the efforts that were made they tested them in laboratory tests. It was discovered that not only external, objective changes noted by physiologists had taken place, but the managers noticed objective, personal positive changes, for example, increased

ability to work after dinner and, which is of no small importance, greater confidence in everything they undertook to do.

The most difficult thing in carrying out any program is personal regulation. We have already become accustomed to demanding and receiving help from the outside and rejecting any effort to control ourselves. There is little doubt that the numerous diets, for example, those which promise easy and rapid return of a beautiful body, have helped few people, mainly not because they are bad, but because it is difficult to find a person who will follow them unwaveringly. Many people think that they would rather not live as long, but without deprivation, than to live a long and dull life. This is what is said by those people for whom a dinner without steak means a meager existence. We destine ourselves to one way of life or another.

But in fact, when we engage in physical exercises according to our pulse rate, there is no need to exhaust and torture ourselves with special diets in order to keep our weight at the level at which we like it. It is sufficient to recall the law of preservation of energy: the energy which you expend must first go into the organism in the form of food. And if you use more energy than you consume, you will inevitably lose weight. And, conversely, 100 kilocalories is enough to change the balance in either direction. Either you eat less or you increase your physical load. The fat cells in an organism are the storehouse "for a rainy day." Today, when all one has to do for food is to go to a store and not go hunting, it is necessary to store up reserves.

The first step in wage regulation should be recognition of the simple fact that the nutritional habits that you have developed are not at all necessarily the ones that you should have....

(continuation follows)

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EMINENT ECONOMIST REMEMBERED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 2, Feb 85 pp 183-186

[Article by V. A. Kolmyk, candidate of economic sciences, Institute of Economics and Organization of Industrial Production of the Siberian Branch of the USSR Academy of Sciences (Novosibirsk): "Mikhail Yakovlevich Sonin"]

[Text] Dr of Economic Sciences and Professor Mikhail Yakovlevich Sonin, a senior scientific associate of the Institute of Economics of the USSR Academy of Sciences died on 8 September 1984 in his 74th year of life.

M. Ya. Sonin is one of the founders of the theory of labor resources. His fruitful ideas gave impetus to the development of this young science. In M. Ya. Sonin's works one can find multifaceted approaches to the study of labor resources and the development of methods of controlling them with the help of the demographic policy, the employment policy, legal legislation, social and public measures, and so forth.

M. Ya. Sonin's books are devoted to vital problems of labor and reproduction of the labor force under socialism. They clearly present the author's scientific concept of employment of the able-bodied population which approaches that of the Strumilin school. Along with S. G. Strumilin, M. Ya. Sonin participated in compiling a section devoted to labor under the 3rd and 4th Five-Year Plans and in the creation not long before the war of a state system of labor resources whose basic principles are retained in the present system of the GPTU. Retaining the traditions of the Strumilin school, he successfully combined theoretical developments with the results of economic and sociodemographic research. M. Ya. Sonin himself educated a large group of students (the author himself is among them). With his works M. Ya. Sonin always provided an example of scientific boldness, commentarial keenness and sharpness, and the ability to get right at the meat of crucial socioeconomic problems.

Mikhail Yaklovevich began his labor life in Smolensk as a manual welder. At 17 years of age he became a Komsomol member, at 20 he entered the Moscow Planning Institute and in 1934 upon his graduation he was sent to work in the USSR Gosplan where he worked for 15 years. Here in 1944 he became a member of the CPSU. As the manager of the sector for personnel training he participated

activities in drawing up the military and economic plans during the years of the Great Patriotic War and was responsible for providing labor force for enterprises that created the "Katyusha," and, along with other responsible workers, he prepared government decisions regarding labor resources. For this work which was so necessary at the time, at the suggestion of the chairman of the USSR Gosplan in 1984 he was awarded the Order of the Emblem of Honor, and a medal.

From 1950 until the end of his life Mikhail Yakovlevich was a scientific associate of the Institute of Economics of the USSR Academy of Sciences. Here he continued his work which was related to national economic planning of labor resources in many regions of our country (the Volga area, the Central Asian republics, Transcaucasia, Kazakhstan and the Yakut ASSR).

Mikhail Yakovlevich was a constant member of the correspondence commissions of the USSR Central Statistical Administration in 1959, 1970 and 1979, and a member of the scientific and economic council of the State Committee for the Utilization of Labor Resources under the RSFSR Council of Ministers and the Scientific Council for Problems of Population and Labor Resources under the Presidium of the USSR Academy of Sciences.

M. Ya. Sonin began to publish in 1934. He has published more than 180 works, including eight books. Many of his works have been translated and published abroad (in Warsaw, Prague, Budapest, Berlin, Bucharest, Beijing and New York). A high rating both in our country and abroad has been given to the fundamental monographs of M. Ya. Sonin, "Reproduction of the USSR Labor Force and the Balance of Labor" (1959) and "Crucial Problems of the Utilization of Labor Force" (1965).

Mikhail Yakovlevich was able to brilliantly combine his practical and scientific activity with pedagogical work. Beginning in 1946 he worked jointly as a teacher of political economics and economics of labor at the MGEK and the Higher School for Occupational Advancement of the AUCCTU, and at the same time he conducted educational work in the republic of Cuba.

The public lectures of M. Ya. Sonin--an active member of the Znaniye Society--and his presentations at scientific and practical conferences were always distinguished by a bold and pointed statement of the problem and were original in form. "It is interesting even to argue with you," his opponents told him.

The magazine EKO (No 3, 1981) published a review of a collection of scientific works by M. Ya. Sonin, "The Development of the Population (The Economic Aspect)." In this collection was concentrated a considerable share of the scientific ideas and results of socioeconomic research of the author during 35 years of scientific activity. The collection reflected the effort with which M. Ya. Sonin consistently defended the need to draw up balances of labor force with a detailed demographic and administrative-economic division, in order to contribute to satisfying both public and individual needs for labor. His proposals concerning strengthening labor discipline and constructing balances of working time and new organizational forms of distribution of personnel remain timely up to this point. Nor have his ideas about the development of female ergonomics and labor placement of pensioners become outdated.

In 1984 a book came out by M. Ya. Sonin with A. A. Dyskin as a coauthor in which the authors in bright, popular style showed the role of middle-aged people in our society, the causes and consequences of the aging of the population, ways of fighting against premature aging, problems of interrelations between parents and adult children, grandparents and grandchildren, and they considered problems of the utilization of labor of elderly people. At the end of the book the authors write: "In conclusion we should like to emphasize once again that the problem is not that there are more and more elderly people, but that they are frequently not employed in the work and the place where they could bring the greatest advantage to themselves, the people around them and the society as a whole, and this problem must be solved comprehensively."

Prof M. Ya. Sonin had a unique personality. He tried to introduce many of his ideas into life himself. "Premature aging and senility," he wrote in his last book, "need not be accepted. Walking and running are for any individual the most natural, generally available and effective means of avoiding various ailments." Mikhail Yakovlevich not only wrote about the usefulness of running, but he himself ran and headed a section for running at the Moscow House of Scientists. In one of his letters during his 70th year he wrote: "As for my birthday, soberly looking lucosis in the face, I have decided to leave science in the very most modest way, but in good shape." And this is what he did. "Written off" by the medical experts and himself not yet knowing the means of treatment for such a disease, M. Ya. Sonin through his active and all-around activity himself prolonged his own life for several dozen years. The last time I met with Mikhail Yakovlevich was not long before his death. He was alone in his apartment sitting at a table filled with manuscripts, page proofs of his future publications, notes about whom he should call in order to chat about something, and so forth, that is, right up until the last days of his life he was at his post. In the memory of all his friends, scientific colleagues and students he will always remain an example of hardiness and scientific longevity.

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EKO CONFERENCE HELD IN YEREVAN

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 2, Feb 85 pp 187-188

[Article: "Readers' Conference in Yerevan"]

[Text] The conference was organized by associates of the Yerevan Institute of the National Economy. It was conducted by its rector for scientific work, doctor of economic sciences, Prof Yu. T. Movsesyan. The deputy editor in chief of the magazine EKO, B. P. Orlov, announced the future plan for publications and answered questions from participants in the conference. Representatives of republic economic management agencies, industrial associations, scientific institutions and VUZes who spoke then, having supported the main directions of the activity of the Editorial Board, expressed a number of critical remarks and constructive considerations.

Thus the deputy minister of light industry of the Armenia SSR, V. Nranyan suggested that the problem of production and sales of consumer goods be discussed more frequently on the pages of the magazine. He drew attention to well-known omissions in the planning of their production, the difficulties in selling certain goods, and the consequences of overstocking (fine sanctions, losses) which complicate the work of the enterprises. Similar issues were raised in the statement by the general director of the Sovetashenskiy Knitwear Association, A. A. Tosuyan.

A responsible worker of the republic state committee for prices, A. I. Rafaelov and the chief of the scientific sector of the Yerevan Institute of the National Economy, F. A. Gushchyan recommended that the magazine devote more attention to elucidating problems of price setting and particularly that it given an analysis of various concepts of price setting and the substantiation of the structure of prices for industrial products.

The head of the department of political economics of the Yerevan Institute of the National Economy, doctor of economic sciences, Prof N. M. Manaseryan and certain other speakers noted the inadequate attention on the part of the editorial board to the publication of materials on theoretical issues. It was also noted that, although it published a number of materials which show shortcomings in the practice of management, the magazine did not devote enough

attention to constructive problems in the restructuring of the management of industry and the effectiveness of cost-accounting relations.

The director of the Yerevan Scientific Research and Planning Institute for Automated Control Systems of the City, candidate of physical and mathematical sciences, E. A. Vartapetov, familiarized those in attendance with the results of the work of the institute related to the study of socioeconomic problems of Yerevan. In particular, objective processing of a mass of information which reflects the needs of the city's population for housing, made it possible to determine a rational order for offering it to the workers.

A docent of the Yerevan Institute of the National Economy, candidate of economic sciences Ye. Minasyan announced the utilization of the magazine's materials in the training process. The director of the house of technical equipment of Sovetskiy Rayon in Yerevan and other speakers recommended that the journal publish more materials on the practice of introducing technical innovations, the role in this of design services and engineering and technical personnel of the enterprises, the functions and rights of the foreman and his material and moral incentives, and so forth.

Prof Yu. T. Movsesyan suggested that the Editorial Board more frequently publish materials on practical utilization of economic and mathematical methods in planning and management of production. In his opinion, the reform of secondary education logically leads to a restructuring of the system of higher education and it would be desirable for the magazine to publish materials devoted to this.

A number of the speakers, particularly the department head of the Yerevan Institute of the National Economy, candidate of economic sciences, Docent A. A. Khondkaryan, asked the editorial board for more extensive elucidation of foreign experience in production management, wages and so forth, and the publication of articles on the development of economic sciences abroad. It was also recommended that they more frequently publish materials devoted to the sociopsychological aspects of management in industrial enterprises.

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HERE'S WHAT COMES FROM 'MAKING WAVES'

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 2, Feb 85 pp 189-190

[Article by M. Belen'kiy (Kiev): "An Atypical Case"]

[Text] Ivanov: Well, let's....

Petrov: No!

Ivanov: Why?

Petrov: Because nobody has done that to me yet.

Ivanov: Well, let us do it! We will be the first.

Petrov: By no means! It is forbidden.

Ivanov: How do you know that?

Petrov: Well, you show me where it is written that it is permitted.

Ivanov: But after all you cannot write down everything that is permitted! Otherwise it would be necessary to keep writing into infinity. For example: It is permitted to eat cabbage pie, to jump on one leg, to drink tea, to run....

Petrov: Show me where it is written!

Ivanov: What?

Petrov: What you just said. That everything is permitted except what is forbidden.

Ivanov: But, after all, that is not necessary....

Petrov: To whom?

Ivanov: To everyone.

Petrov: Where is it written?

Ivanov: Everyone knows.

Petrov: Everything that is necessary is determined by higher instructions.

Ivanov: There is such an instruction. Here. Read!

Petrov: So.... Display initiative. What is the date here? A very good instruction. Now let us wait for specific instructions. To whom should we manifest it, on what date and who should be held responsible.

Ivanov: If we do this they will promote you.

Petrov: I doubt that. And if I do not do it they will not do anything to me. And that is the main thing!

(Telephone rings)

Petrov: What? Fire me because of a lack of initiative? And who is to take my place? Him?! (He replaces the receiver and turns to Ivanov). You heard the last instruction? They are appointing you to my job.

(Ivanov sits in Petrov's chair. Sidorov enters.)

Sidorov: Well, let's.

Ivanov: No!

Sidorov: Why?

[See beginning]

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In the second place, he is convinced that the result of his future work will be registered with equal detail and objectivity and will be compared with what he inherited so that it will be known if the indicators he has achieved are worse than the ones he inherited.

And I have tried to observe this principle of open distribution of resources, assignments and duties everywhere. For example, the monthly plan is turned over to the foreman only after he has certified with his signature that he has agreed to it. Previously it was necessary to prove this to him.

V. A. Skripov: But what if the plan turned out to be unbalanced for the shop? This happens, after all, and not so rarely. Let us assume that the wage fund does not correspond to the volume of output.

D. P. Kuzmitskas: In these cases I have explained the situation and shown that the shortage will be divided proportionally among the foremen (each receives the same percentage of the complete supply). If there is an adjustment this percentage is increased equally for all. But if there has been no adjustment and the foreman has allowed an overexpenditure by the amount of the imbalance, this is not reflected on his record. I think that in these cases the shop chief should take all of the responsibility.

And one more important remark which I should like to discuss: the assertion of the principle of one-man management of the foreman in the section. It is necessary in all ways to support him in this status. It has happened that the worker has gone to the shop chief with the request after the foreman has denied it. Let us say that we are speaking about an absence. In this case if I have felt that the foreman has been too harsh or laid it on too thick, I still suggest that the worker return to the foreman, and then I have met with him and if he was wrong, advised him to change his decision. With the proper ingenuity and tact a conflict can almost always be resolved without violating general principles.

V. A. Skripov: The last question, which will more or less sum up our conversation: in terms of what external, as it were, indicator can one evaluate the quality of personnel work with line managers?

D. P. Kuzmitskas: I recall one conversation which took place among experienced workers during a tourist trip. "Why," asked one of them, "does a new foreman work better at first and then drop off after a month or two?" I responded with this suggestion: more likely it is not the foreman who has ceased to work so well, but your requirements on him have increased. Initially you gave him room thinking that he was a newcomer, and then you begin to take him seriously.

And I thought: and they speak about our foremen as if they were somehow unnoticeable. The foreman has been replaced--and nothing has changed! The section operated well and it continues to operate as if it were running

itself. And in this "anonymity" of management one can see a well-adjusted system which provides for a reliable inertia of movement and succession, and this is probably also a manifestation of an advanced art of administration.

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SIGNIFICANCE OF URBANIZATION ANALYZED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 2, Feb 85 pp 113-127

[Article by A. S. Ladinskiy, engineer-architect, winner of the USSR State Prize (Novosibirsk): "The Building Which Is Being Built...By Whom?"--a discussion]

[Text] The author of this article--engineer-architect A. S. Ladinskiy--saw the first stakes driven for the future institutes and residential microrayons of the Novosibirsk Scientific Center. A winner of the USSR State Prize in 1953 for new technology for manufacturing reinforced concrete, he along with Academician M. A. Lavrent'yev accepted each new building of Akademgorodok. For its construction Anatoliy Sergeyevich was awarded the Order of Lenin.

In his article in LITERATURNAYA GAZETA, which anticipated the article by A. S. Ladinskiy, "What To Build? Where To Build It?," M. A. Lavrent'yev wrote: "As the calculation shows, within the next decade it will be necessary to attract to Siberia from the regions of the country with a surplus of labor no less than a million people, and the living conditions should be created for them so that the immigrants will remain in Siberia for a long time, forever, and call this beautiful region their home." More than 10 years have passed, but these lines remain as timely as ever.

Today we shall familiarize the readers with the suggestions of A. S. Ladinskiy concerning the organization of a "second current" of residential housing construction, which might help in solving the housing problem.

In January 1985 the author was 80 years old. He is working to this day, filled with strength and creative activity. The editorial staff hopes that the problems touched upon in a his article will attract the attention of interested organizations and readers.

In the City or the Suburb?

Urbanization--this word rang out proudly 2 or 3 decades ago. To work in the city and to live in the city were the greatest dream of many rural residents, both in our country and abroad. Since that time an industrial revolution has taken place and for more than 200 years there has been growth of industry, growth of the cities and growth of the number of urban population.

They left for the city to make a living and they never returned, leaving the countryside bare, depriving it of working hands and, naturally, depriving it of population growth. Philosophers and writers--opponents of urbanization--compared the city to a gigantic octopus which was absorbing everything, but the proponents praised the giant cities--the creators of a new era for mankind.

The reverse process, which has begun unnoticed in the past 2 decades, only marks a tendency of the return of the urban population to the land. The process, however, has causes which do not submit to systematization.

The saturation of the cities with industrial enterprises and their oversaturation with people have brought about the problem of settlement, which throughout the world is urban problem No 1. The majority of capitals of the world are literally being suffocated from overpopulation. Where can they work, where can they live? Where can pensioners and young children go where even in the greenest cities specialists are waging a desperate battle for each percentage point of fresh air?

Attention is drawn to the fact that in developed capitalist countries the tendency toward acquiring private homes is manifesting itself increasingly clearly. In particular, in France suburban homes have become widespread. People who have completed their labor activity are happy to move into them. In other countries more significant segments of the population live outside the cities.

In recent years in our country too the attraction of the urban population to the land has been sharply manifested. People wait in line to obtain garden plots. Every available clump of land is cultivated very painstakingly by amateur gardeners, orchard growers, "sadists," as they call themselves. Pleasant labor that is within one's capabilities, which also brings quite appreciable results, not only improves the tenor of life and strengthens the health, but also produces a significant increase in the production of vegetables, fruits, berries and even meat products on the scale of the country. We are also experiencing the educational effect--children, as a rule, are enlisted to work on the plot.

But how does one link the charm of suburban life with public production, which is frequently very distant from the place of residence of the city dwellers. Technical progress has its own laws. In spite of all the arguments on the subject "where the development of civilization is leading us," it does not intend to release its positions and concentrate its power in large industrial cities. The city today means the largest associations and firms, VUZes and scientific research institutes, theaters and stadiums, schools and

kindergartens. A large city means hundreds of thousands of residents, and each resident has his own route to work, as a rule, on crowded transportation. And in the evening, returning home by the same route, we end up in an apartment that is filled with noise from the street. Perhaps this is why even the younger generation is experiencing a nostalgic attraction to the land, to the suburb, to the possibility of being alone with one's thoughts in nature, far from the tense life of the large city.

Is it so necessary for everyone who works in a large city to live there as well? Undoubtedly many wish to live as close as possible to their place of work, to the theaters and museums. But perhaps no fewer people wish to live within the proximity of the city, of the place where they work, but still outside the city. Television has brought theaters, concert halls and exhibits close to us. This, of course, is not an altogether adequate replacement, but do we really go there more frequently even if we live in the very center of the city? The development of automobile traffic has made the distances shorter, and the dream of full relaxation at the end of the working day has become a reality.

So far we have been speaking about cities which have already taken form and have their own structure of settlement and their own traditions. But in our country there are also many new cities which are just being created, whose development is related to the assimilation of new industrial regions. Can they not be constructed taking into account the complaints which we make today against the modern overpopulated city?

What Will It Cost Us To Build a House?

In the future each family should be given a separate, spacious, well-arranged apartment with a number of rooms corresponding to the number of members in the family. According to our calculations this will require increasing the annual volume of housing construction 1.5-2-fold. The state does not have the necessary support for this: neither material nor human resources. Hence our proposal concerning the creation of a so-called "second current" of housing construction.

How do we imagine that this will be? The "second current" should be created mainly with funds from the builders and necessarily with their participation in the production of construction materials, parts and in the construction of the building itself. The "second current" should have specific residential buildings which are simpler in design and methods of work and have a complete set of service structures: garages, sheds, basements and, without fail, orchard and garden plots.

Siberia is undoubtedly the most suitable place for conducting this extensive experiment. Not only is it necessary to provide housing for the labor resources that are attracted there, but it is also necessary to essentially improve the conditions for labor and life. The severe climate and the so far inadequately unutilized natural resources are the most typical features of Siberia which must be taken into account when assimilating the new industrial regions. Under the conditions of the severe climate the people spend considerably more time than the residents of the European part of the country do.

The average provision of each individual with overall dwelling space in Western Siberia is 1.5 square meters less, and in Eastern Siberia--2 square meters less than in the European part of the country. The building up of the residential supply in Siberia is also lagging behind the western and southern regions which are better supplied. Among the other problems in improving the well-being of the workers, the housing problem here is the most critical. Its solution will make it possible to attract and retain skilled personnel who are necessary for the more rapid development of the productive forces in this region.

The October (1979) decree of the CPSU Central Committee and the USSR Council of Ministers "On Further Development of Plant Production of Wooden Panel Buildings and Sets of Wooden Parts for Buildings With Walls Made of Local Materials for Rural Housing Construction," is being carried out slowly. It envisions increasing the production of wooden buildings with plant manufacture to 7.1 million square meters by 1985 and to 11 million square meters by 1990. There should be a corresponding increase in the output of sets of wooden parts for residential buildings with walls made of local materials: to 8.5 million square meters in 1985 and 12.2 million square meters in 1990. This a new stage in housing construction and our suggestions are directed toward carrying it out.

The "second current" in the construction of low buildings which are located close to the city limits is a real way of solving the housing problem. Such buildings can become the main housing supply for small cities and suburbs of large industrial centers.

Who wants to live outside a city and work in a plant or factory? This question is removed for many urban residents if each building is given a garden and orchard plot. This is also shown by the numerous questionnaires conducted by the author of this article and that mass inclination toward labor on the land which has been so clearly manifested among urban residents in recent years.

I must stipulate immediately that we do not have in mind single-apartment buildings of the rural type. The construction of such buildings would create new and very serious difficulties. First of all, the heat losses (and this means also the expenditure of fuel) would increase three- to fourfold in them as compared to the same urban apartments. Expenditures on the external network of heating and sewage system and on the construction of boilers and purification systems would increase by approximately the same amount. Nor do we share the conclusions of those people who support multistory buildings in rural areas with gardens and orchards that are crowded outside the suburban settlement. Of course this can be done, but why create artificial difficulties? Moreover we must not forget that the nature of work on the plot near the home and in the suburban plot are quite different. While in the former kinds of plots all family members work a little bit during their free time, in order to cultivate the latter kind it is necessary to sacrifice an entire Saturday and Sunday, transforming days off into a labor obligation for one member of the family who is relieved of other household chores especially for this. Our variant involves a four-apartment garden building. Is it advantageous?

Economic Prerequisites

As early as the beginning of the 1950's the number of apartments being constructed by the population at their own expense with the help of state credit amounted to half of the housing under construction in the country. Now garden homes which are annually being constructed by the population comprise less than one-fifth of all the housing under construction, and in the RSFSR--only 14 percent. The process of sharp reduction of the construction of housing through the forces and with the funds of the population is most marked in places where even without this the housing supply is worse than in other regions of the country. For example, in 1951 in Kursk and Voronezh oblasts 37 percent of the overall amount of housing being constructed annually were buildings constructed with funds from the population, in Krasnodar Kray--40 percent, and in Perm Oblast and Western Siberia--only 10 percent, and in Eastern Siberia, even less--8 percent.

As investigations show, the availability of a garden residential building for the family contributes to retaining personnel to a much greater degree than do increased rayon coefficients, the introduction of additional benefits and so forth. Now Siberia is distinguished by increased migrational mobility. Of the 11 million workers a considerable proportion annually moved to other places. The damage from this kind of migration is quite appreciable.

The changeover to mass construction by the population of low residential buildings with garden and orchard plots and outbuildings for keeping cattle will make it possible to solve several serious problems at the same time. We have already discussed retaining personnel and, moreover, the garden will be a significant aid in supplying the family with products, and the surpluses which will go to the market will improve their well-being and appreciably improve the country's food supply.

Mass construction of garden buildings will also make it possible to solve any social problems such as the organization of active recreation for the workers; the fight against hypodynamism, which medicine today includes among the most significant diseases of civilization; distraction from inactive, drunken leisure time; and the attraction of children from an early age to work on the land, which will play an invaluable role in the system of labor education. At the same time we shall solve the problem of improving the health of the population--both as a result of balanced full-value nutrition and as a result of the positive change in their way of life. Mass construction of four-apartment garden buildings is economically more advantageous than single-apartment buildings, and it is considerably easier to organize construction with the efforts of four families.

Theoreticians of urban construction and architects are strongly against the idea of constructing four-apartment buildings, but those builders who are shown the plans for these buildings and to whom the economic advantages are explained quickly come to favor them. The little garden house should undoubtedly have the full complement of amenities: a heated bathroom with a bathtub and shower with hot water, and well-regulated heating. The first story must have heated floors.

What is so special about our suggestions? We are suggesting constructing a relatively inexpensive building, but with a full set of modern conveniences. The cost of one apartment for the average family in a four-apartment two-story building, taking into account all of the outbuildings and the garden plot will, according to our detailed calculations, be about 10,000-12,000 rubles, and taking into account the private labor of the builders--even less.

We suggest using the four-apartment building as a basis also because it is approximately 30-40 percent less expensive for one family than a single-family apartment building with the same amount of dwelling space, and 15-20 percent less expensive than a two-apartment building. Its heat losses are less and heating it will require five-eighths to five-ninths the amount of fuel that it takes for a single-apartment building and five-sevenths the amount it takes for a two-apartment building. Moreover, the plan we have suggested provides for more complete building up of the territory. Taking into account that five to six-hundredths of land are allotted for the garden or orchard plot, this provides for an average density of the population of 25 people per 1 hectare, which is comparable to the density of population in small cities.

The experience in building buildings of this type convinces us that the two-story apartment is much more convenient than the single-level building. All of the garden buildings, for example, in the Novosibirsk Akademgorodok have also a third level--a basement with a convenient stairway, and some of the buildings also have residential rooms on the mezzanine.

Questions and Answers

As we can see, the problem has become crucial and the practical solutions to these problems have become ready. Let us take a look at what can impede their implementation. The volume of individual housing construction has only decreased in recent years. One of the reasons is the false reference to the shortage of land for the "garden home." It seems to us that this reference is based on a lack of knowledge of the present situation with respect to the utilization of the urban land supply in our country. For example, within Novosibirsk the average density of population is nine people per 1 hectare, in Irkutsk and Kazan--five people, and on the plots where the two-apartment cottages stand surrounded by garden and orchard sections--15 people per 1 hectare. Unsuitable land can be used for building low garden buildings--the slopes of ravines, for example, which are not suitable either for fields or for multistory construction.

The second objective amounts to the notion that individual buildings without hot water, without warm bathrooms and without convenient heating no longer satisfy the people, and mandatory provision of each individual building with a centralized system of heating, water supply and sewerage is costly and metal-intensive. Here they absolutely do not take into account the fact that we know have about 33 cities and 69 villages of an urban type that do not yet have centralized sewage systems and that 43 percent of the population still use stoves for heating up to this very day. Of course, in many cases centralized heating systems are a matter of the not-so-distant future, but in places where this is impossible or for some reason is difficult, one can install in each suburban apartment automatic heating equipment, for example,

the Ugolek-4 which will serve as a kitchen stove and at the same time will maintain automatically given conditions for water heating in the apartment. There are also heating stoves with a large heat capacity which have also been somewhat forgotten, but are convenient to operate. These include stoves made of brick, and prefabricated concrete and reinforced concrete elements. There is no serious problem with manufacturing such stoves today.

One of the promising variants of the solution to the problem, especially for Siberian buildings with inexpensive electric energy, is to change over to electric heating. If one adds to this the heating of water for household needs, the application of all the ordinary household electric appliances and an electric stove, during a year one individual will require 5,000-6,000 kilowatt-hours of electric power.

But for certain regions of Siberia where the climatic conditions are especially difficult, when there is relatively inexpensive electric energy that is obtained from burning the least expensive local fuels, this dream can be transformed into a reality in the next few years--if the electric energy is taken at night, when its consumption drops sharply. Water furnaces with large thermal capacities are needed for this.

In particular, the residential buildings of the garden type which we consider expedient to construct along the BAM could be heated by water furnaces from nighttime electric energy, leaving rock coal or peat as a reserve fuel in the event of an interruption in the power supply or heavy cold spells. And if it becomes possible to obtain heat from a thermal supply line that is passing by and to discharge sewage into a main network, it will be simple and inexpensive to do this without essential changes in the design.

The organization of our proposed "second current" of mass housing construction in Siberia of two-four-apartment buildings of the garden type can lead to a considerable increase in the expenditure of fuel which is even now in short supply. But the "antidote" is well known to architects and builders--it is necessary to increase the insulating properties of the walls and the upper coverings 1.5-2-fold as compared to those that are ordinarily used today.

One more quite important issue which must be solved in order to develop the "second current" of housing construction is fecal sewage. The sewage system for industrial and household wastes in the country now leave something to be desired. The cost of the structures for biological purification of sewage waters is very high. And all the construction of purification installations for sewage from industrial enterprises and cities is being carried out throughout the country on a significant scale, it would be self-delusion to count on having the problems solved in the next few years.

But is it really necessary to wait until all of these problems are solved before finally beginning mass construction of the "second current" of housing? Is it necessary to have a centralized sewage system which is suitable for cities and large industrial enterprises in order to carry out our suggestions? We consider this to be not only a costly extravagance, but also a loss of an immense quantity of water resources and value chemical substances which can be used for fertilizing the land. A possible variant is a cesspool near the

building which, when properly organized with ventilation through a heated channel does not produce any odor in the apartment. The so-called air closets are used extensively in Europe and America. From the household sewage system they lay a perforated asbestos cement pipe from underground irrigation which is sunk to about 1.0-1.2 meters, through which they irrigate and fertilize the garden plot at the same time. The method of underground irrigation in this case is coordinated with sanitary inspection, and it is economical and maintains the normal conditions for life in the rural building.

How Is This Building Done?

The fact that people without construction skills can erect immense shops and complicated engineering structures has been shown by the experience in mass construction during the war and especially during the period of postwar reconstruction of the destroyed cities. Each year student construction detachments erect thousands of buildings and structures, although, as a rule, there are no building specialists among the students.

There is no doubt that it is necessary to have special planning of garden residential buildings with simplified designs which do not require complicated working. Unfortunately, all 284 types of individual buildings recommended for Siberia, which are mainly single-apartment dwellings, do not take into account the fact that they will be constructed by people who will be taking construction tools into their hands for the first time, and moreover these plans are intended for rural areas where engineering systems are available.

The creation in Siberia of a large "second current" of garden housing construction is possible under the condition that the urban resident believes in the advantages of the garden home with well-regulated heating, a warm bathroom and hot and cold water.

It would be expedient even in the next few years to construct models of two- and four-apartment garden buildings with all of the amenities, garages, cellars and sheds. Their construction should be entrusted to the best construction organizations of the oblast so as to have standards for mass independent activities in construction. It will be necessary to exert effort and organize the output of special prefabricated reinforced concrete for the heating devices and cesspools. It would be expedient to develop the blueprints of the buildings with the necessary set of service premises individually for each Siberian oblast, taking into account the existing bases of the construction industry, local resources of construction materials and so forth. Along with wood it is possible to use slag concrete, gas concrete and other kinds of concrete, rush pressboard, "Chernozem binding," porous fissured rock, adobe and other local materials.

We have all the prerequisites for restoring the construction of this type of building even now. Some of the large panels of the "outdated series," those which have defects and are not suitable for multistory construction but are quite acceptable for our purposes can be sent to individual construction sites. With time it will be possible to create specialized sections for casting the garden buildings in a good standard prefabricated metal casing. It will be possible to cast this kind of building almost completely from various types of plastic concrete--the method is quick, inexpensive, and the building is practical and durable.

In the Urals and Siberia they are now actively constructing buildings with walls made of slag concrete, which does not require much cement. Walls made of this are warm and durable.

Gas concrete wall blocks for low buildings are the best and least expensive material, which is being widely used in housing construction in the Scandinavian countries. We also have 20 years of successful experience in using gas concrete blocks in the walls of low buildings in Sovetskiy and Leninskiy rayons of Novosibirsk.

A new and very promising type of low residential building has now appeared in the country. The large panels of the outer walls and attic coverings have a thickness of only 15 centimeters and consist of a light wooden frame with flat wood chip slabs 13-16 centimeters thick glued to both sides. The interior space in the walls is filled in with foam plastic with a volume weight of 50 kilograms per cubic meter. A square meter of this kind of wall weighs no more than 40 kilograms and in terms of its thermal insulation properties this extremely light wall is as good as even the best brick wall, which is 80 centimeters thick. This superior and inexpensive plastic is wood. It is manufactured for commercial use mainly in construction and does not require any complicated or costly additional processing.

The Politburo of the CPSU Central Committee has considered the question of improving the utilization of timber in the main directions for the development of the timber complex under the 12th Five-Year Plan (PRAVDA, 26 November 1983). It is time to put an end to the practice of ignoring timber--one of our best construction materials. In 1950 we felled and shipped 280 million cubic meters of commercial timber. In 1982 we also produced 280 million cubic meters. The proportional decline in the significance of timber in the national economy contradicts the resurrection of timber that is taking place today in the majority of developed countries for more and more varied construction purposes.

And the water reservoirs that are under construction are still flooding valuable timber...

An engineering and economic reference: from 1,000 cubic meters of round timber one can construct no less than 20-25 good apartments, and from 1 million cubic meters of round timber--20,000-25,000 apartments in buildings of the garden type. As calculations show, the annual increase in timber in the country is 800 million cubic meters, and we are felling only half of this. If we increase the annual selling by 12-15 million cubic meters for individual housing construction, each year it will be possible to construct an additional 10 million square meters of dwelling space in addition to the 100 which we now produce in all of our main enterprises of the construction industry.

Here are some lines from an essay by the writer Ye. Vorob'yev, "Man Over the Angara" (Moscow, "Sovetskaya Rossiya," 1981):

"The architects of the hydroelectric project who were living and working in Bratsk had designed for the Kodinskiy Flatland a nice settlement for 1,500 individual lots. The settlement is growing up to the south of the city and

spreading out not far from the shores of the future sea, near the future piers and docks. In Moscow they liked and approved the plan of the Boguchanskiy "India" (standard wooden buildings). But the Krasnoyarsk Division for Construction and Architecture took up arms against the individual settlement. The plan which originated in Bratsk for building up the region on the Kodinskiy flatland with small plots of land in standard buildings was erased from the blueprint and this means also from the Krasnoyarsk land. The plan was considered in the higher organizations in Moscow without this little settlement."

What conclusion was reached by the leaders of the USSR Gosstroy and Glavgozeksperitiza when in the autumn of 1980 they considered the plan for the Boguchanskaya GES? In the conclusion of the essay one reads: "Among the shortcomings of the plan for the settlement in the Kodinskiy flatland is the fact that they ignored the possibilities of organizing individual building which provides for economizing on state capital investments in housing construction and contributes to keeping the personnel in the eastern regions of the country, and so therefore it is necessary to single out in the settlement a separate microrayon for these purposes."

Construction has now been started on this kind of settlement, but the Krasnoyarsk Krayispolkom has unjustifiably limited it to 200 buildings although there were three times this many people who wished to build a home with their own money.

There are the most varied opinions concerning the expediency of individual construction of block buildings in Siberia. Block buildings are just as popular among the population as those hewn from logs. The block buildings constructed in the Novosibirsk Akademgorodok will stand for a long time and they are convenient to live in. Among the people who admire them is Academician M. A. Lavrent'yev who lived for about 20 years in such a building and considered life in it to be more hygienic and convenient than in a brick or concrete building. At the same time residents of the northern areas near the Yenisey and Ob' are dissatisfied with block buildings.

We think that it is not the buildings that are to blame but the fact that in planning they did not take into account the specific requirements for these buildings. Their walls are practically never built from dried wood. The timber dries after it has become a part of the structure. In order for this not to cause damage the plan must envision free settling of the walls. The design diagram for the building with bearing walls made out of round logs or blocks should be the simplest. Such a building must be correctly caulked, and in recent years one cannot find people in the "caulking" profession at the construction sites of Siberia.... And so there are a whole number of technical details like these which must be taken into account in order for a good idea to be realized successfully. All of these technical details can easily be restored from old construction literature, but the complete rejection of plans that have proved themselves in past decades can be explained only by the laziness of the designers and their lack of desire to worry about state money.

We have presented this far from complete list of variants of the organization of the "second current" of housing construction in order to prevent the usual objections to additional development of housing construction which, as a rule, are based on the lack of construction materials.

It is obviously time to prepare suggestions concerning individual and cooperative housing construction in the "second current"--both for small cities of Siberia and for suburbs of large industrial centers. The funds and labor of the builders and the funds and materials of industrial enterprises that are interested in offering housing to their workers and employees, and also the production capacities of construction organizations will be enlisted for this construction.

At the plenum of the Moscow CPSU Obkom in 1983 and the session of the oblast soviet of people's deputies they set the task of reaching by 1986 an annual level of construction of buildings of the garden type in a volume of 400,000 square meters of overall dwelling space a year, which will amount to 80 percent of all the housing that has been introduced in the Moscow area. We think that no less of a percentage of garden residential buildings should be constructed as well, which has considerably more land than the European part of the country does.

Such a solution to the housing problem seems quite justified to us. The residents of large industrial centers are quite ready to move into buildings with garden plots, and architects can give them a "package" of their suggestions so that they can be given differentiated consideration in individual rayons, taking specific features into account. This readiness, it seems to us, should grow into a decision which has legal force and a specific party to implement it.

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ENGINEER RESPONDS TO ARTICLE ON ENGINEERS

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 2, Feb 85 pp 128-130

[Response to the article by S. S. Starshinov, "The Role, Payment and Return From the Engineer," EKO, No 2, 1984, by G. N. Nikitin (Kazan): Confession of an Engineer"]

[Text] S. S. Starshinov's article entitled "The Role, Payment and Return From the Engineer made a great impression on me and caused me to think and even confess, if I may put it that way, because I do not have much time left before I receive my pension....

And so I am an "engineer" (I deliberately put this word in quotation marks) who has worked in the division for about 20 years. I have a diploma but for a long time I have felt that I am more of a pseudoengineer.

A couple of words about myself. I grew up in a working family. My father, a mechanic, instilled in me a love for metal and he hoped that I would become the same kind of skilled worker as he was. After the seventh grade I went to a trade school, after which I began to work successfully at a plant as a lathe operator. The shop management took note of my good work. One day the shop chief called me in and said: "Listen, why do you not go into the eighth grade in night school? You will learn something and you will grow more."

He convinced me. I completed the 10th grade in night school. And again the shop chief called me in and advised me to go and study in the evening division of the institute. I wavered for a long time. I was well aware of how difficult it is to work and go to school at the same time. By this time I had also managed to get married. I consulted with my wife (she was a worker and worked at the same plant as I did), and she was happy and said:

"Of course, after all it is more honorable to be an engineer...."

So I went to continue my studies. Do you remember?--At the beginning of the 1960's this was very fashionable. So I had one more barrier behind me--the institute. In my coat pocket was an engineer's diploma. Most evening students and correspondence students are well aware of how we passed

examinations in those years. The only thing I like to remember now is walking the young ladies and girls home from class.

And so I had a "clean" job. At that time the salaries of engineers were not much more than my earnings in the shop, and I easily moved into my new job.

A year passed, 2, then 5.... Since I had almost no engineering knowledge, and they did not augment it in the division, I finally became apathetic. And here they began more and more to take our brother engineer away for other socially necessary jobs. I began to go out on the street with a broom and shovel, to work at the construction site and in other subsidiary jobs. My salary began to differ more and more from the earnings of my fellow lathe operators. Finally I was even embarrassed to look them in the eye. At every meeting they joked:

"Look, there goes an engineer!..."

This name followed me like a shadow. I could not return to the shop, to the lathe, because I had forgotten the skills of lathe work and I was afraid of more jokes from the workers, but the main thing--I must admit--I had become rather lazy.

There were scandals in the family:

"Look," said my wife bitterly, "how much your former friends are earning--300 to 400 rubles! And you? What kind of wages are you bringing me, engineer? I am a woman and I still earn more than you do!"

In a word, in the end I did not make a good staff worker (and I probably could have been), but I certainly did not become an engineer. Apparently all these years I was occupying an alien position. I understood that people become engineers by vocation, but it was too late.

I completely agree with the word of Comrade K. U. Chernenko at the meeting with the voters to the effect that today it is necessary to reduce the management staff and bring the people closer to the machine tools. That was quite correct. It is necessary to introduce order with engineering personnel as well, which was discussed by S. S. Starshinov in his pointed article. I am singling out two aspects from it.

"Keeping more engineers or, rather, more engineering positions than are actually required aggravates the need for labor force.

"It is necessary to increase the wages for real engineers by reducing the number of pseudoengineers and subsequently placing the latter in other jobs."

I wish to augment S. S. Starshinov's ideas by beginning long ago.

A real engineer who was involved in his work worked with me in the division. He was constantly searching and discovering. Technical ideas just poured out of his head. He would come running out of the technical library--and run into the shop and write something down; sometimes he would be preparing an article

for the central technical journal and sometimes he would be filling out his next application for an invention. In a word, he was really enthusiastic about his work. I envy him. He is a direct person, and he always argued boldly with the management, defending his own ideas, for which he became an undesirable worker. And his salary was less than they gave me, a pseudoengineer. I understand that that is unfair. With his efficiency proposals and inventions that had been introduced into production he had more than justified his salary. But I was eating somebody else's bread. Apparently my conscience persuaded me right before pension age.

For the sake of advantage and fairness I would suggest making a strict delimitation between real engineers and pseudoengineers with the establishment of the corresponding salaries. A real engineer should receive a salary on a level with that of the skilled worker and even more.

How is this done? I do not know an exhaustive formula, but one could begin this way: drop into the BRIZ of the enterprise and discover what technical solutions have been suggested by one engineer or another. It is necessary to take those solutions which were submitted by one or two people and not collective ones which sometimes include 10 authors and more. I was a pseudoauthor of several efficiency proposals. I was included as a pusher.

And so if an engineer (he and he alone) has received an author's certificate for an invention--consider him (the author) a real engineer. There is your measure. Then my comrade about whom I wrote above would long ago have had a salary larger than mine.

Invention is probably not the only measure but if one uses it to come to a decision about an engineering problem, the majority of pseudoengineers will automatically be weeded out.

Well, and where will they go? In my opinion they should be transferred to the position of technicians, that is, one should reach a situation such as the one that existed previously, where there were three to four technicians for every one real engineer.

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RESERVES OF MINERAL RESOURCES EXAMINED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 2, Feb 85 pp 131-147

[Article by Yu. A. Chernegov, doctor of economic sciences, professor, Council for Study of Productive Forces under the USSR Gosplan (Moscow): "Are Minerals Becoming Scarce?"]

[Text] We are legitimately proud of the Soviet mining industry: 26 percent of the world mining products are produced in our country. We not only have a reliable mineral raw material base for the development of the national economy, but we also satisfy a significant proportion of the need for mineral resources of the countries of the socialist community and use some of our mining products for mutually advantageous trade with capitalist and developing countries.

In recent decades the extraction and preparation of mineral raw material and fuel has become appreciably more expensive. Production outlays are increasing not only absolutely, but also relatively in the expenditures of industry. Thus the proportion of extraction of mineral raw material and fuel in capital expenditures in industry has reached 45 percent under the current five-year plan.

The increased production outlays in the extracting branches cannot but disturb us. This unfavorable tendency is usually explained by the exhaustion of minerals in the regions where they are traditionally mined, the shift of mining production to the north and east, the greater depth of extraction, the reduction of the content of useful components in the natural raw material and other circumstances. Not everything, however, is true in these ideas.

But How Is It in Fact?

In spite of widespread opinion, production outlays for the majority of kinds of mineral raw materials in the northern and eastern regions are no higher, and even lower than in the traditional ones. Thus the cost of extracting coal there is only 46 percent of the average union level, extracting copper--44 percent, and processing--27 percent, extracting zinc and lead--83 percent, and their processing--72 percent. This relationship, as figures on newly

constructed enterprises in the coal industry, for example, show, will apparently be retained in the future.

The opinion that the capital-intensiveness of the mining products is greater because of the mining industry to the northeastern direction is widespread. Where did this idea come from?

Methodological Outlays

The explanation gives an analysis of these specific features of the capital investments in the mining industry. The deposits of solid minerals are worked in descending order. The upper surface is prepared for mining first. These jobs take up the initial investments. As the supplies of the upper surface are worked, they prepare the next layer, which presupposes additional capital investments. They do not produce an increase in the production capacities of the enterprise, but only make it possible to maintain it at the level that has been reached. Therefore as the mining work goes deeper, at the existing enterprise the capital-intensiveness of the products increases.

When extracting petroleum and gas the total return from the wells initially increases, and then it begins to decrease. In existing petroleum and gas industries the capital-intensiveness, consequently, also increases.

Capital investments for maintaining the capacity is a peculiarity of the investment process in the mining industry. In the coal and iron ore industry capital expenditures on maintaining the achieved capacity are approximately twice as great as the initial investments. The fact is that the capital investments for maintaining the capacities are made by almost every enterprise, while relatively few new enterprises are being constructed. In 1983 the proportion of new construction projects as compared to existing enterprises in the coal industry amounted to 4 percent, and in the iron ore industry--8 percent.

Because of the lack of figures concerning initial capital expenditures and capital investments on maintaining the achieved level, proportional capital-intensiveness and capital-output ratio are calculated by the usual method for other branches: capital investments (or the increase in fixed capital) are divided by the increase in capacities. And since the capacities of the mining industry are increasing mainly in the north and east, one draws the conclusion that these regional changes are making them more expensive.

It turns out that capital investments basically are assimilated, mainly the western, regions of the country offer increasing capacities that are being introduced mainly in the northern and eastern regions.... The sum, of course, does not change, but the conclusions concerning the effectiveness of the distribution of the mining industry are distorted.

One should also take into account the zonal prices for products of the mining industry. Wholesale prices for the main kinds of minerals and products from initial processing, which were introduced beginning on 1 January 1982, are lower precisely in the north and the east, which reflects the national economic effectiveness of mining production in these regions. So far there

are no unified prices for mineral raw material, which would give a more precise idea about the output-capital ratio in the mining industry for the various regions. And the calculated figures for the coal industry show this.

If one takes the wholesale price of a ton of conventional fuel in the western regions as 100 percent, we receive a relative amount of the wholesale price of coal in the eastern regions of 62.1 percent, including for grade G--67.7 percent, D--82.1, B--131.0, K--85.4, Zh--61.9, OS--46, T--53.7 and A--53.9 percent. Thus for all the grades of coal extracted in both zones (with the exception of grade B), the price of a ton of conventional fuel in the eastern zone is lower than in the western zone. The relative increase in the cost of coal of grade B is determined by the high expenditures in certain remote regions and the so far insignificant participation of the Kansk-Achinsk basin. With the development of the extraction of Kansk-Achinsk coal, the situation will change even with respect to this grade.

Does Deeper Mean More Expensive?

The question of whether or not the depth of mining work influences the technical and economic indicators might seem idle at first glance: it is clear that a depth of 400 meters is not 200 meters. But there is no reason to simplify. The general rule of mining developments is to work the deposits in a descending order, and the greater depths are reached later. The average speed of reaching the depths rarely exceeds 10 meters a year. Therefore it takes a good deal of time to overcome a 100-meter difference in depth, and during the course of this time new technical and technology usually appears, technical re-equipment and reconstruction of the enterprise are carried out, and the effect of the factors that increase costs is compensated for by a reduction of proportional expenditures.

This statement of the problem is confirmed by the practice of many years of operating many deposits of useful minerals in our country and abroad. Thus the deepest mine in the country, the Korkinskiy coal mine, which is reaching the 420-meter mark, has repeatedly been reconstructed with improvement of the technical and economic indicators. And despite the depth of the working, the production cost of a cubic meter which is removed from an open pit mine is 77 kopecks, that is, less than at many pits located in more favorable conditions.

The nature of the change in the technical and economic indicators when mining work becomes deeper at individual enterprises applies differently to various regions and branches. As supplies of minerals are exhausted on one section or another the mining work is halted, and in order to maintain or to increase the extraction, new enterprises are constructed on other sections. Even if the natural conditions at the new sections are on an average worse than at the old ones, initially the conditions are still better than they were for working the preceding mines. Therefore the conditions for extraction in the various regions and branches change much more slowly than they do for individual enterprises, and there is greater latitude for solving the problem of technical-re-equipment.

Here are the data concerning changes during recent years in the average depths of the mining of coal, iron and asbestos ore (tables 1-3). As one can see the

depth of extraction of minerals in the branches is changing very slowly. But in the coal industry, because of the expansion of extraction by the open pit method, it has even decreased during the past year.

Table 1--Change of Average Depth of Coal Extraction
in Ministry of Coal Industry

Years	Average Depth, Meters	In mines		In pits	
		Depth, Meters	Proportion of Overall Extraction, %	Depth, Meters	Proportion of Overall Extraction, %
1970	285	356	74.2	82	25.8
1975	313	409	69.2	96	30.8
1980	327	457	63.2	104	36.8
1983	325	473	59.2	110	40.8

Table 2--Change of Average Depth of Extraction
of Iron Ore, meters

	1970	1975	1980	1975 compared to 1970	1980 compared to 1970
Total	227	233	259	1.03	1.14
Including:					
In mines	526	553	601	1.05	1.09
In quarries	146	164	199	1.12	1.36

Table 3--Change of Average Depth of Pits and Extraction of Asbestos
Ore in Ministry of Construction Materials Industry

	Depth, meters	Extraction, thousand tons	Depth, meters	Extraction, thousand tons	Depth, meters	Extraction, thousand tons
Uralasbest						
Combine No 1-2	96	3,000	110	3,000	120	3,000
Yuzhnyy	172	6,755	176	10,378	185	11,079
Tsentral'nyy	205	19,392	225	25,258	245	20,958
Kustanayasbest						
Combine	120	3,458	130	10,742	145	10,748
Tuvaasbest						
Combine	120	745	120	1,549	130	2,740
Orenburgasbest						
Combine	--	--	--	--	45	3,223
Total-average	178	33,350	185	50,927	188	51,748

The average depth of extraction of iron ore can also be significantly reduced, but this is impeded by the shortage of technical equipment--polygradient separators. With the beginning of the output of domestic separators it will be possible to begin to mine immense supplies of oxidized iron quartzites

which are near the surface in many deposits. Moreover, the tailings from enriching factories, which contain 22-24 percent iron, will be processed. They are on the surface of the land, that is, at 0 depth. The tailings from enriching factories should be regarded as a deposit of the anthropogenic type, which contain material which is ideally prepared for enrichment (with the appropriate technology, of course).

It is possible to reduce the depth of mining in all branches of the mining industry. We are speaking about methods of so-called repeated working of deposits. The fact is that it begins to make sense to extract those materials from the deposits which were previously considered unsuitable for mining because of technical and economic considerations (unconditioned materials, materials in barrier and technological blocks, interstratal pockets and so forth). With the progress of technical equipment and technology it becomes possible and economically expedient to utilize these.

The significance of repeated working is clear if only from the example of the Karaganda basin. Here on the mine fields and in existing mines there are about 2 billion tons of minerals that were not previously earmarked for mining, that is, more than on the fields that are being worked. Additionally, the minerals that were not previously earmarked for mining lie at depths of 600-800 meters, and the new mines have to go down to 1,000-1,400 meters.

The existing opinion about the reduction of the capacities of the deposits is not always confirmed by analysis. Even in the Donbass in recent years the average capacity of the coal beds that are being worked has increased somewhat. The average capacity of the coal beds in the Ministry of the Coal Industry in 1975 amounted to 1.14 meters, in 1980--1.16 meters, in 1982--1.18 meters, and in 1983--1.16 meters.

The Value of Poor Ores

The reduction of the content of the useful component in ores is also given as one of the reasons for the deterioration of the technical and economic indicators of mining. But the question must be divided into two parts. The first is related to the purely natural factor, and the second--to that activity of people, technical equipment, technology and the organization of production.

Thus data for the Donbass show that the natural ash content of coal has increased insignificantly. The main reason for the sharp increase in the ash content of extracted coals is the operation of many mining faces with the so-called trimming off of surrounding rock because of the imperfection of the technical equipment and also sometimes direct violation of technology. For 10 years now this situation has been promoted by the policy adopted in the coal industry of accounting for the extraction in terms of the mining mass including 10-12 percent of impurities of barren rock from the soil and the roof of the bed. This is the direct result of inefficient activity, to which we must not reconcile ourselves.

As for the content of the youthful component in the ores, this matter seems obvious: when reprocessing poorer raw material the output of commercial

product is less and the expenditures are greater. But this is true only when the technical and technological conditions for processing raw material of an equal quality are all the same. And this should not be done. And, actually, nobody does this.

Ash Content of Coal in UkrSSR Ministry of Coal Industry, %

	<u>1970</u>	<u>1975</u>	<u>1980</u>	<u>1983</u>
Stratified	20.4	21.2	21.9	23.1
In extracted coals				
a) From "mined mass"	23.9	29.11	32.6	35.8
b) Reported	22.1	24.2	26.6	29.0
Dispatched coal				
(after enrichment)	16.9	18.1	19.4	19.6

We know of unique geological interconnections: the lower the content of the basic useful component in the ore, the larger the supplies themselves and thus the relative content of side components in the ore. With such materials one can and should create especially large enterprises and shops for their agglomeration. Here powerful technical equipment, principally new technology and the organization of the management of production are advantageous.

Thus an analysis of the variants of the mapping of 13 iron ore deposits in the Far Eastern region shows: with the reduction of the average content of metal of 20 percent, the supplies of crude ore increase by 90 percent, and the overall quantity increases by 73 percent. The pattern of the growth of supplies being more rapid than the reduction of the content of the useful component is used in calculations when creating enterprises. According to the norms, for example, of technological planning of iron ore enterprises the following rough ratios are established: with a tenfold increase in supplies, the capacity of the enterprise increases fourfold, and the time period of its operation is prolonged 2.5-fold. For all of the existing iron ore enterprises, the average interconnection looks like this: with the reduction of the content of iron in the crude ore from 50 to 20 percent (2.5-fold) the annual capacity of the enterprise increases from 5 to 45 million tons (ninefold). As a result, the factor of reduction is not only the reduction of the proportion of conventionally permanent expenditures, but also the reduction of the annual amortization deductions.

With reduction of the content of the useful component in the ore there is a predictable reduction of the distribution of its qualitative characteristics, which makes the raw material more technological. For example, an analysis of the changes in the qualitative indicators of the supplies of ferrous quartzites at the various levels within the Lebedinskiy mine at KMA reveals that with reduction of the average content of iron by 3 percentage points, the coefficient of the variation decreases from 17 to 10 percent, and the dispersion of the distribution--from 40 to 10 percent. The stability of quality is reflected favorably in the neutralization and enrichment of ores. With a change in the content of the main component in the ore other favorable changes also take place.

For iron ore enterprises, for example, where the basic method of extracting iron in the concentrate is wet magnetic separation, the content of magnetic fractions is important. One can see practically a direct dependency between the iron content and the losses in the tailings from enrichment: with a 40 percent content of iron in the initial ore, 15 percent goes into tailings, and with a 20 percent content--the wastes are 6 percent.

Let us note that in and of itself the content of the useful component far from always plays the major role in the utilization of mineral raw material. Other physical or chemical properties or a combination of them can be more significant. The ores from the Kachkanarskiy deposit with a less than average iron content are suitable for smelting pig iron because of the ease of their enrichment while in other deposits it is expedient to discard rock that has an iron content of 22-24 percent.

With reduction of the average content of the useful component in the mineral raw material the factor of the increase in geological supplies takes form as a factor in improving the technical and economic indicators with concentration of production and improvement of technical equipment and the technology of production. Therefore, in spite of the regular impoverishment of iron ores, the content of metal in the concentrate increases. As a result the technical and economic indicators of the branch not only do not deteriorate, but even improve. Thus iron from relatively poor ferrous quartzites turns out to be considerably less expensive than iron from naturally rich ores. And, conversely, the most expensive iron is smelted from naturally rich ores from underground extraction in the Krivoy Rog basin.

Comprehensive Utilization

The extraction of side components of the organization of comprehensive productions are indispensable conditions for effective utilization of raw material with a low content of the main useful component. Another important law is in operation here: with the reduction of the content of the main component there is a relatively increase in the value of the side components. It is as though the main components and the side components exchange places in terms of significance. Thus for producing aluminum one uses bauxites, nephelines and alunites (listed in the order of reduction of the content of aluminum oxide) as raw materials. According to calculations, when the content of the main component is reduced by half, the content of the side components and the ores increases threefold. The total cost evaluation of the ores with reduced content turns out to be higher than bauxites. The Piklev Clay Combine operates with waste-free technology for comprehensive utilization of nepheline concentrate which in addition to aluminum oxide contains sodium, potassium, silicon, gallium and rubidium. Because of the deep comprehensive processing of raw material, the production cost of aluminum oxide at the combine has decreased during the past 15 years by 37 percent, and side products--by 20 percent. Now the aluminum oxide obtained here from Kola nepheline is the least expensive in the branch: its production cost is approximately 32 percent less than the branch average. Profitability is increasing steadily: at the combine it is equal to 14.0 percent, while the average profitability of the aluminum industry is 9.9 percent.

For comprehensive utilization of raw material it is important to select the appropriate depth of enrichment. The fact is that with respect to the basic component either related or not related. With an improvement in the extraction of the main component the degree of extraction of related components increases, and unrelated ones decreases. The unrelated components that have gone into tailings can be lost and those that have gone into concentrate can be extracted at the next processing (in metallurgy, chemistry and so forth).

As long as comprehensive processing of raw material is not given the proper attention, the goal is to increase the degree of extraction of the basic components. Comprehensive processing of raw material allows a reduction of the degree of extraction in the stage of enrichment so as to gain an advantage in the next processing. This is the situation with the processing of copper ores in which the degree of extraction of copper into the concentrate has decreased, but the comprehensiveness of the utilization of the ores has increased essentially.

Man-Made Supplies

One of the issues that is still disputed is that of irreversible losses of minerals during the course of their extraction and in tailings from enrichment factories. Indeed, technical equipment and technology are producing limited possibilities of economical extraction of minerals from the earth and useful components of them from natural raw material. Let us emphasize: economical extraction. For in principle it is technically possible to sharply reduce losses in many known technologies.

As we know, losses of minerals when they are extracted by the underground method are significant: as a rule, they amount to 20-40 percent, sometimes reaching 60 percent. There is a practically universal method of appreciably reducing losses: marking out the worked space. But this device makes the extraction more expensive, and therefore it is used relatively rarely--when extracting especially valuable kinds of mineral raw material and those which are in short supply.

When minerals are enriched the losses frequently can be reduced by changing the conditions for the operation of the equipment and reducing its productivity. This, unfortunately, reduces the technical and economic indicators of production.

Of course there are many cases in which the losses are brought about by the lack of effective technologies or their imperfection. But new technologies, and sometimes quite unexpected ones, are appearing regularly. We know of examples of repeated working by the open pit method of deposits which were previously worked with underground technology. Supplies which were at one time considered irretrievably lost are now being extracted more effectively than with the special methods of underground extraction.

Working of coal deposits that are in complicated mining and geological conditions by the underground method sometimes means considerable losses of minerals amounting to more than half of the initial supplies. Such losses

amount to hundreds of millions of tons, and all of them are considered irretrievable. There has appeared, however, a technology of underground gasification. Because of the new technology a paradoxical dependency takes form: the more supplies that are lost earlier, the more effective it is now to work them.

The practice of enriching minerals is filled with examples like this. As the technical equipment and technology improve there is a return to repeated processing of tailings from enrichment factories. What was previously lost because of the lack of means of extraction or increased cost, is extracted very effectively under the new conditions.

Progress of Technologies

Current methods of enrichment make it possible, for example, to economically extract from the ores only magnetic fractions of iron. The technologies for extracting weakly magnetic varieties through preliminary roasting are imperfect and too expensive. As a result, 22-24 percent of the iron contained in the processed ores goes into tailings of enriching factories. Moreover, oxidized ores are not used for processing, and the supplies of these are colossal and lie very close to the surface. Frequently these supplies are sent to the dumps along with barren rock.

But technology for enriching iron ores using separators with a strong magnetic field is already on the way. It will transform the tailings from enriching factories into deposits of minerals. Their value is especially great since the raw material has already gone through the stage of crushing and pulverizing--the most expensive of the enriching processes. The new technology will make it possible to process supplies of oxidized ores as well.

The problem of exhaustion of minerals is closely related to the problem of their loss. The fashion for predicting the time periods for working supplies of one mineral or another arose under the influence of the ideas of the so-called "Roman Club." Without discarding the grain of truth in their appeals to utilize mineral raw material economically, one must recall: such predictions have been made repeatedly and each time they have been refuted by scientific and technical progress.

Thus 2,000 years ago in ancient Greece they discussed the prospects of working the "last" deposit of iron ore.¹ Sometime later they addressed the problem of the "iron famine" in ancient Rome. At the beginning of our century at the World Geological Congress one eminent scientist announced that the last gram of iron would be extracted in 1988....

Not even a quarter of a century passed before the ideas about the supplies of iron in the earth were radically changed. And not so much because of newly discovered deposits, but because of the reevaluation of iron ore in ferrous quartzites--these were previously not taken into account. But after the creation of effective technology for processing them they cover a considerable proportion of the need for iron ore raw material.

The examples can be continued. But even now one can draw constructive conclusions: as one kind of raw material which has become traditional is exhausted, new ones are being developed, and this possibility is opened up by new technologies. From the example of the changeover from naturally rich to poor iron ores it is clear that a reduction of the effectiveness of production is certainly not inevitable.

Economizing on energy resources and developing nontraditional sources put off the threat of an energy famine in the indefinite future. But the ideas of replacing traditional mineral and raw material sources with new ones are less known to the public than suggestions concerning the utilization of new sources of energy. This does not mean, however, that there is any paucity of innovations. Among those with the best results are the developments for synthesizing nonmetallic minerals: diamonds, piezo-electric crystal, precious and semiprecious stones, mica, asbestos and amphibolite asbestos.

Even in prewar years Academician A. Ye. Fersman advanced the idea of "creating deposits." He suggested looking for new technologies for the application of minerals that are not extracted or are poorly utilized in production, thus replacing traditional products with new ones.

Thus in the Ukraine they developed the production of basalt fiber. The initial raw material for it is widespread rock--basalt, diabase, amphibolite, hornblendite and others. A modification of this fiber--superfine basalt fibers and threads--effectively replace chrysotile asbestos which is in short supply.

The possibilities of comprehensive utilization of mineral deposits, deep processing of mineral raw material and the creation of composite materials with previously given properties are far from exhausted, and this limits the need for mineral raw material. For example, the organization of production of even 20,000 tons of niobium a year and its utilization as an alloy supplement is equivalent to increasing the smelting of steel by one-third.

The creation of new alloys opens up the possibility of reducing the consumption of mineral raw material. In the table of chemical elements there are 80 metals, and industry uses only about half of them. We have studied the properties of only 25 percent of the possible bimetallic compounds and about 0.25 percent of the trimetallic ones. Compounds made of four and five elements have been studied quite insignificantly.

As the supply of scrap metal increases there will be an increasingly large proportion of metallurgical charges. According to calculations, beginning in approximately 1990 this will lead to a stabilization of the extraction of iron ore, in spite of the increased smelting of steel.

Let us recall, finally, the possibility of geotechnology as predicted by Academician V. I. Vernadskiy, which he understood as the acceleration of geological processes in order to form and restore the deposits of minerals on certain sections of the earth's crust.² In the future new mining technology will open up the prospects for unlimited mineral raw material potential.

When speaking about factors of potential improvement of the economy of the mineral raw material base, one must keep in mind that these are still operating very weakly. The basic reason for the increased cost of mineral raw material and fuel lies in the underutilized possibilities of scientific and technical progress, which is capable of covering the negative effect of natural factors. In mining production there is still a prevalence of traditional technology and technical equipment, and changes pertain mainly to individual indicators. Rapid dissemination of the achievements of scientific and technical progress in production can undoubtedly stabilize and then lead to a reduction of expenditures in the mining industry.

FOOTNOTES

1. Oleynikov, A. N., "V Nedrakh Planety" [In the Bosom of the Planet], Leningrad, "Nedra", 1979, p 71.
2. Recently in scientific and technical literature the term "geotechnology" has been used in a different sense: it means the totality of methods of well extraction of minerals (underground gasification of coal, underground smelting of sulfur, leaching of metals from ore with chemical and biological reagents, and so forth). V. I. Vernadskiy introduced the term earlier, it entered world mining literature and reflects the priority of domestic science.

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EXPERIMENT IN ELECTING MANAGERS RELATED

Novosibirsk: EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 2, Feb 85 pp 148-153

[Article by L. P. Podmarkova, junior scientific associate, Institute of the International Workers Movement of the USSR Academy of Sciences (Moscow): "When They Have a Choice"]

[Text] To begin with two facts: at the section for large fittings of the Lvov Elektron Production Association a difficult situation arose. The collective was not fulfilling the plan, labor productivity was low, the workers were complaining about the foreman and they expressed dissatisfaction with the style of management. They wanted to replace the brigade leaders in the section but they could not agree on a single candidate. Then on the advice of sociologists they decided on an experiment: instead of appointments they held elections for the foreman and two brigade leaders.

Things did not change for the better immediately. But reinforced with the confidence of the workers, the managers were able to overcome some negative changes. Relations within the collective became smoother, and gradually a good working attitude came to the shop. Within a year it turned out that labor productivity had almost doubled and earnings had increased by more than 40 percent.

Another example. It is known that the better the adjusters' work, the more leisure time they have: well-adjusted equipment does not break down so often. Taking this into account, at certain enterprises of Minsk in searching for better forms of intraplant cost accounting [khozraschet] they decided to teach the machine tool operators the associated occupation of adjuster--for when the equipment was not in good repair there was nothing for them to work on. The machine tool operators now receive additional payment for combining occupations and a bonus for eliminating breakdowns of equipment, their skills have increased, and they are more satisfied with their labor. Downtime of equipment and labor turnover have decreased and labor productivity has increased.

Both of these cases are remarkable. They show the significant reserves for improving production and increasing its effectiveness that lie in attitude toward labor that is filled with initiative and interest.

The value of all experience has been accumulated in the local management collectives: the brigade contract and work under a single schedule-order. Under the current five-year plan the brigade form should become the basic one in labor organization. Previously brigades were created in those cases when, because of production and technological conditions, one-time participation in labor by a group of workers was required. Each one performed his own operation and his labor was paid for individually, regardless of the overall results. Now the brigade is becoming a socioeconomic unit which collectively controls its own activity. It should be a cost-accounting unit, have a clear-cut plan and work according to a single schedule-order. At the Volga Automotive Plant all of the workers are combined into such brigades, and at the Kaluga Turbine Plant--96 percent of the production workers.

One of the important indicators of the brigade is its self-control. The brigade council (which changes management and feels the responsibility for the common results of their labor) or meeting decide all the main issues--distribution of work, tariffs, norm-setting, the utilization of working time, and sometimes--even questions of collective recreation and behavior in daily life. They bear responsibility for the final results. A building is constructed on time with expenditures in keeping with the estimate, tons of coal mines with expenditures no higher than the planned production cost, and so forth.

The brigade, as a rule, sums up its results each month and earmarks plans for the future. It becomes a school not only of labor, but of management as a whole, discussion and adoption of decisions, a school of responsibility. But only if it operates under conditions of efficient management, stable normatives, well-arranged supply and efficient accounting. And this places high demands on all units of management. It is impossible to improve the situation in one unit while leaving the rest of them unchanged. In places where this is the case the brigades disintegrate or they exist only formally on the registers.

In the Leningrad Krasnogvardeyets Production Association they have calculated that an increase in labor productivity of 35-40 percent is provided through social factors. They are multifaceted: the creation of a healthy psychological climate, correct formation of the collective, and accounting for the interests of various groups of workers. For youth, the prestige of the operations they perform, the possibility of increasing qualifications and the content of the labor are very important. For female collectives it is typical to have high demands on working conditions, shift work and the personality of the manager--his tactfulness and fairness. All this cannot but be taken into account when forming the brigade.

It is important for the election of the brigade council not to be turned into a formal act. For it also turns out to be like this: "Whoever you want as long as it is not me." At the Kiev Automated Machine Tool Plant imeni M. Gorkiy it was noted that many workers kept track of their own work and payment separately. It turned out that people working in the brigade do not trust the council--those comrades whom they themselves have elected. This means that when combining people into brigades they have not prepared them

psychologically and, while working under a single schedule-order, each of them feels himself to be "an individual"....

Good results are produced by the selection of workers in keeping with their psychophysiological data and their mutual compatibility. At certain enterprises they manage to arm themselves with this. At the Moscow Automotive Plant imeni I. A. Likhachev, for example, the brigades are formed taking into account the personal sympathies and desires of the people to work together. At the Lyuberetsy Rug Combine (Moscow Oblast) the brigades are staffed taking into account the psychophysiological characteristics of the workers. They join together people who can work with the same effort and at the same rate. With this kind of selection the possibility of conflicts is reduced to a minimum.

The brigade is one of the units of the collective. The basic cost-accounting unit of the socialist economy is the association or the independent enterprise. As a rule, it produces the final product which is ready for the consumer--the machine tools, the suits, the rolled metal or the candy. And not only in the brigade but in the enterprise as a whole the worker should constantly know, feel and be able to carry out not only his labor, but also his management functions. Otherwise even the best-organized brigades will not comprise a unified collective--the enterprise. Otherwise it will not be an enterprise, but something like "apanage principalities"....

Immediately after the civil war V. I. Lenin wrote: "I think that trusts and enterprises with cost accounting were established mainly so that they themselves would be responsible and completely responsible for the profitable operation of their enterprises."¹ It seems that the realization of this piont under modern conditions consists in that the enterprise itself earns its wage fund, that, in other words, it cannot obtain a single kopeck without a corresponding increase in the final results--the output of products that are ready for the consumer, products which meet the requirements of the standards and technical specifications.

And if we introduce or retain for the plants and factories the channels of stimulation not for the final results, but for immediate results, then we are not strengthening cost accounting and we are not learning to manage effectively. Because under these conditions of operation which are "social security-like," one might say dependent with respect to the society, both the worker and the "master" end up in a bad position. The dependent is dependent: and he wants to take more than he will give....

With cost accounting organization of the work of collectives one should exclude such possibilities of increasing the wage fund as budget allocations and bank loans that are repaid with new loans. Then it will be necessary always to earn the funds for payment for labor, that is, to produce the products that are necessary to the national economy and with expenditures that are no greater than planned. The wages will be higher as productivity increases and the number of workers decreases. The latter are of no small importance with the modern shortage of labor force, and with the present low rate of shift work in industry (less than an average of 1.5 shifts). As for earnings, they should be deposited in the wage fund that is created.

The conditions for cost-accounting responsibility are capable of putting the collective's internal reserves into effect. The enterprise--both the administration and the workers--instead of the frequent "justifications" and requests to reduce the planning assignment (but not the wage fund!) and justifications of their own mistakes by objective factors--the negligence of the suppliers, transportation workers, building subcontractors--which we see today, will devote their efforts and energy primarily toward improving the actual results of their work. Here is where the economic eye of each worker is especially important and valuable. Permanent production conferences, public bureaus of economic analysis, and people's control groups and posts obtain a broad field of activity. They have been created at each enterprise. But in many cases the possibility of obtaining free assistance from the budget, banks, or the ministry or adjusting the plan make it not so necessary to search for reserves, they suppress initiative, and they dull economic incentive.

It is important for every worker to be well-informed about the plans of the enterprise--long-range and current--and about the results of his economic activity, so that each one can participate in the discussion and comparison of the possible variants of the development and improvement of production, so that each one's suggestion will be considered attentively and intelligently. Because it is only on this basis that it is possible to realize the right of the manager-worker, the owner of public production capital to participate in management, to invest in the social economy his heart and mind, spirit and thought. And not only within his own work position, but also within the enterprise and the national economy.

It is extremely important for all workers to be able to obtain exhaustive information about the plans for the development of the enterprise, its reconstruction or its changeover to new kinds of products. Without reliable information it is impossible to evaluate the variants with the goal of selecting what is best and most rational. Why, for example, not take the results of the economic activity beyond the balance commission so that the entire collective will know all of the profit and losses, the reasons for them and the lessons to be drawn from them? And so that the director will have to justify himself not only to the main board, but also to the collective?

It seems that it would be useful to experimentally test the practice of creating councils of associations not only made up of officials, but also of representatives elected by the collective--workers and employees. Or the election of brigade leaders, and section and shop chiefs? Perhaps it would be effective to have permanent meetings of representatives of the workers of associated enterprises. It would hardly be possible to put them off by blaming someone else's--only not their own--mistakes, by assurances that "we will correct things," for here what would be important would be not words, but deeds--the promptness of the deliveries.

When we have inadequate effectiveness, productivity and economy--in many cases it is because of the economically unhealthy indifference of those who work at the machine tools or the drawing board, who organize deliveries or establish the planning assignments. And when we analyze the experience of the brigades

or shops that have sharply increased their return, as a rule we come to the conclusion that they have achieved success because each worker has felt himself to be a true master of production: his interests truly were affected.

FOOTNOTES

1. Lenin, V. I. "Poln. Sobr. Soch." [Complete Collected Works], vol 54, p 150.

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AUTOMATION CHANGES SECRETARIAL WORK

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 2, Feb 85 pp 154-161

[Article by I. V. Serafimova, Institute of the United States and Canada of the USSR Academy of Sciences (Moscow): "The Administrative Secretary Under the Conditions of Automation"]

[Text] American statistics lump secretaries in the same group with typists, stenographers and other office workers. In 1983 it included 15.8 million people, that is, more than 14 percent of the overall number of people employed in the economy. This is one of the most widespread professions. According to estimates of the U.S. Department of Labor, every fifth office employee in the country performs secretarial functions.

For a long time having a secretary was a sign of prestige of certain positions. The secretary had to be on the job all the time, to be able to communicate with visitors and to have an attractive appearance. It was thought that his role in the organization was purely auxiliary and he did not actually participate in management. The volume and significance of mechanical work he performed (typing, stenography, preparation of correspondence and so forth) was greatly exaggerated. Gradually the opinion was formed that the secretary was an "organizational excess" who increases expenditures on maintaining administrative personnel. Therefore when electronic computer equipment appeared in American offices there immediately arose a question: can it not be used to reduce the number of secretaries?

It seemed that a solution had been found. In the private sector and in government institutions centers were created for automated processing of textual information (AOTI) which were equipped with modern office equipment. Dictaphones, automatic typewriters and machines that were blocked with computers (the memories of the latter included the most commonly encountered phrases in business correspondence) considerably reduce the time and expenditures on the preparation of documents. It was suggested that the mechanical functions of the secretaries be transferred to these centers. Some companies completely eliminated this category of employees. All the functions for administrative service in them are performed by the managers themselves: they write letters by hand or on a typewriter, they make copies when necessary, they set meetings, keep dossiers and so forth. Other firms took

more moderate action. In every second case when organizing an AOTI center the number of office personnel decreased. At the same time these centers were processing immense masses of textual information and they expanded and accelerated formal communications in the organization.

Along with the AOTI centers they organized centers for administrative service to which they also assigned the reduced volume of secretarial functions. In these one administrative secretary provides service for several managers and specialists.

The practice of both kinds of model centers was extensively advertised in business and specialized journals. They were actively supported by suppliers of modern office equipment who were interested in the sales market. At the end of the 1970s deliveries, particularly of automated word processing systems,² began to increase at rapid rates (20 percent per year).

Here is only one of the numerous examples given by the American press. Before the introduction of an automated word processing system in a small (56 specialists) advertising agency there were six secretaries. Now this position has completely disappeared from the organizational chart. Of the technical auxiliary personnel there has remained only the courier and the keeper of the archives. The secretarial services were eliminated first in the bookkeeping agency, where auxiliary personnel were replaced by young bookkeepers--college graduates who were familiar with automated word processing systems. Gradually the automation encompassed all the other divisions. As a result, the quality of the correspondence improved, the flow of paper decreased, and overtime work related to text processing completely disappeared. But this kind of streamlining has been noted only in small firms and, as a rule, in the sphere of services.

Further operation of the centers showed that the real effect from their activity turned out to be less than expected. There was always a multitude of organizational and sociopsychological problems which canceled out the technical advantages of these innovations.

For example, in the administrative service centers that simultaneously satisfied the needs of various managers, business contacts inevitably became impersonal and their effectiveness was reduced. One of the largest insurance companies in the United States, Prudential Insurance, in order to improve the quality of administrative services and labor productivity, was forced to take a step backwards and introduce specialization in its AOTI center, that is, it actually returned to the old system of assigning worker of the center to functional subdivisions, but on a new technical basis.

A deeper analysis of the activity of skilled secretaries showed that it was only through them that the managers communicate informally with their subordinates. The higher a manager rises on the service ladder, the more he is separated from the normal social relations and the more important a good, reliable secretary is to him. The latter not only organizes business contacts, but also gives them an emotional overtone, which is strongly reflected in the effectiveness of the ties. The secretary can indirectly both contribute to the job advancement of the manager and his increased authority,

or impede these. American sociologists note that frequently before making their new ideas public the managers share them with their secretaries, thus trying to predict the reaction in the organization as a whole.

But in the centers the rigid formalization of relations between the secretary and the manager "isolated" both parties, the manager was separated from the system of informal relations, and the secretary was deprived of his status and the privileges associated with it. Turnover increased among workers in the centers.

Without an assistant at hand the manager was forced to take on some of the functions of a private secretary, mainly those which required independent decisions of the latter. But the working time of the manager is much more expensive. Therefore one must be concerned about labor productivity of both, and consider them as a unified "management team." The effectiveness of the activity of the organization as a whole depends to a significant degree on the smoothness of its operation and mutual understanding. Excessive streamlining of the work of the secretary alone inevitably reduces the labor productivity of the manager. No less important is the ability of the manager to work correctly with his assistant, to delegate some of his authority to him. Far from all managers are able to do that. In order to teach them, special subjects are introduced in business schools and courses for advanced training. Without waiting to carry out this suggestion, the company Nationwide Insurance itself teaches the new work methods to its managers and secretaries at the same time.

Special research has revealed one more mistake in the approach on which the organization of centers is based. It turned out that secretaries spend only 22 percent of their working time actually processing numerical and textual information, and 35 percent--on the performance of various administrative duties, 25 percent--on errands out of the office, and 18 percent--in idle time and waiting for work.

Four basic groups of secretarial functions were singled out:

administrative service--telephone communications, receiving visitors, copying documents, registering correspondence and so forth);

drawing up the work schedule for the manager and making sure that it is carried out, work with correspondents and other functions that require decisions-making;

functions conditioned by the specific nature of the institution, which are different, say, for a law office, a hospital, a shop and a trade firm, and require of the secretary not only mastery of office procedures, but also special knowledge;

typing, stenography, the ability to use the teletype and other mechanical functions.

In this classification the mechanical functions occupied a similar position. In the United States today there is no shortage of stenographers or typists.

Moreover, the significance of the traditional basic secretarial skills is declining. In 1960 practically all of the secretaries actively used shorthand, in 1970--83 percent, and in 1980--only 45 percent. Previously they had to have a typing speed of 60 words a minute and be able to type for 10 minutes with 100 percent accuracy. Now 45 words a minute is enough, but the requirement for editorial skills has increased sharply for this category of worker.

Certain firms have transferred some of their mechanical functions to specialized subdivisions. Yet the work of the secretaries has changed insignificantly, but the labor productivity has increased. Relieved of large typing jobs the secretary acquires new qualities and his authority is expanded. He participates in the preparation of various reference materials, reports, plans and important documents. He is trusted to write business letters independently. It has been noted that the quality of letters written by skilled secretaries is on the average higher than those that are prepared by the managers themselves. The private secretary is gradually becoming a specialist in administration, making decisions of secondary importance for his boss, and handling certain items of the company budget (most frequently business trip and office expenditures).

Research of one of the leading consulting firms, Booz, Allen and Hamilton showed that a good secretary corresponds to a middle-level manager in terms of his business qualities.

According to the estimate of another consulting company, Quantum Science, even by the middle of the 1980's in the United States there will be a critical shortage of skilled secretaries. The overall need of the American economy for specialists of this profile, in spite of the extensive introduction of computer equipment, is increasing considerably. According to official data of the U.S. Department of Labor, up to 60,000 vacancies for secretarial positions will remain unfilled each year. The main reason, in the opinion of the department, is the inadequate professional training of the applicants for the position and their inability to work in automated offices.

Certain schools and colleges of the United States have introduced a particular specialization--secretarial sciences, which include bookkeeping, office affairs, stenography, typing, psychology and archive work.³ But this knowledge alone is not enough. A modern secretary must be excellently oriented in that sphere where the given firm operates, in the process of administration, and he must be able to use computer equipment. In 1960 60 percent of the secretaries used terminals that were connected to computers or automated word-processing systems, in 1983--75 percent, and in the near future it is expected that all of these work stations will be fully automated with personal computers.

Even now, for example, the construction division of the firm Westinghouse Electric in its staff room in Pittsburgh has replaced all the secretaries' typewriters with personal computers. Now all of the internal documentation exists in unprinted form and goes directly onto the screens of the computers of the managers and secretaries. The computers print out only final documents. Large texts are transmitted to the automated text processing

center. The secretaries have great possibilities of creative activity and take on some of the duties of the boss. In the opinion of American managers, this path promises the companies much greater economic advantages than do centers for AOTI and administrative service.

In order to improve the utilization of computer equipment it is suggested that men be actively recruited for secretarial positions. Now they comprise only 1 percent of the overall number of people employed in this sphere. There is the hope that the situation will change in the near future since, according to data of the U.S. Society of Administrative Services, a skilled secretary receives higher wages than a senior computer operator does (mainly a male occupation). A desire is being expressed to change the title of the profession "secretary" to a more prestigious one, say "office assistant" or "specialist in text processing," which men consider preferable.

What are the prospects for automation? Centers for AOTI will, as before, actively operate in large companies with a large volume of printing work and with good organization of labor. Moreover, it is necessary to take into account that not only managers, but also rank-and-file specialists need the services of the centers. The need for them in administrative service is associated mainly with typing work, but the business contacts are less personalized. This area for the development of the centers also has its problems, for instance, the workers employed in them should be recruited from those professional collectives which they serve, as equal members, and their productivity should be evaluated according to the final results of the operation of the entire subdivision.

Experience shows that automation in and of itself does not solve the problem of labor productivity in management since the administrative staff is not simply a mechanism for adopting rational decisions on the basis of information that comes in, but a complicated social system which is relatively isolated from the production and distribution of products. Improvement of its work requires specific methods and approaches which are based not only on the analysis of the work that is performed, but also on a study of the sociopsychological peculiarities of specific management systems.

According to the estimates of American specialists, automation of administrative and auxiliary functions is in an important stage of development. Right up until recently all efforts in this area have been directed primarily toward streamlining the work of secretaries and office employees. The nature of the functions they perform themselves have remained unchanged, and automation has practically not affected the activity of managers and specialists. Yet increased effectiveness of the labor of these main groups of employees is the only possible criterion for selecting one system or another.

FOOTNOTES

1. Ushanov, Yu. A., Ushanova, A. O., "Automated Preparation of Business Papers in the United States," EKO, No 1, 1980.
2. Ibid.

3. The American Association of Secretaries has calculated that 96 percent of the people who take the examination for the title of professional secretary have a specialized secondary or higher education. Of these 39 percent acquired this specialty in a school, 40 percent completed a 2-year college, and 17 percent completed regular 4-year colleges.

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IMPORTANCE OF COMPUTER DATABANKS DISCUSSED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 2, Feb 85 pp 162-166

[Review by Academician Ye. P. Velikhov, vice president of the USSR Academy of Sciences (Moscow), of the book by L. V. Kokoreva and I. I. Malishinin, "Proyektirovaniye Bankov Danykh" [Designing Databanks], "Nauka", Main Editorial Board for Physical and Mathematical Literature, 1984]

[Text] The president of the USSR Academy of Sciences, Academician A. P. Aleksandrov, writing on the pages of the newspaper IZVESTIYA (18 January 1984) in an article entitled "The Task Until the End of the Century," enumerated several immediate tasks which must be carried out in order to raise our society's productive forces to a qualitatively new level. It is noteworthy that the first to be named was the task of extensive utilization of means of information science, computer equipment and automation in all spheres of activity.

Today at various enterprises, organizations and institutions computers store, search for and process an immense quantity of information. In all branches of the national economy the volume of processed data is increasing geometrically, and it is difficult to imagine these branches functioning without computers.

The basis of the computer system of any specific area is the storage of information, which is called the database. The concepts of "database," "database management system," and "databank" have begun to develop rapidly as directions in the area of data processing systems. Many competent Soviet and foreign specialists consider the appearance of database management systems and data banks to be a revolution in the area of information systems. For example, Charles Bachman figuratively illustrates this idea as follows: "Copernicus gave us a new point of view and presented the principle of celestial mechanics. This point of view provides a basis for understanding what previously seemed to be mysterious paths of movement of the sun and the planets through the heavens. A new principle has appeared in the area of information systems: previously the center was the computer, now it is the database."

Certain results have appeared from the creation of databanks in the area of automated control systems, planning, supply and all possible kinds of

accounting, including accounting for personnel keeping dossiers, accounting in the sphere of services and trade, ticket sales, the issuance of information in airports and railroad stations, library loans, medical, pharmaceutical and other references in various informational and reference services. Databanks are beginning to be developed and function in information computer systems, in systems for secondary processing and interpretation of experimental data, and in reference systems such, for example, as the bank of nuclear data.

But the boom in the area of databanks and the increased interest in their application on the part of specialists of the most varied branches of science, industry and business have led to a situation in which one sometimes observes an excessive increase in these, a kind of fashion. As a result of this they sometimes try to apply databanks in places where there is no need for them, where they are ineffective and where it would be quite adequate to take advantage of the capabilities of the filing system or a specialized system for data management. This is a negative side effect which is brought about by the inadequate knowledge of the specific area in which the databanks are to be used and an inadequate knowledge of the capabilities and aspects of their application and also methods and means of developing complicated modern systems. In this connection there is no doubt about the need for and timeliness of the book by L. V. Kokoreva and I. I. Malashinin, which is devoted to the problem of planning databanks.

What does the problem involve? Selecting or creating a "system of program, language, organizational and technical means that are intended for centralized accumulation and collective utilization of data." One cannot agree with this definition which is given in the book under review. Apparently all one needs to do is to point out the need to develop means of automated programming without a programmer.

Both the scientific and the scientific-technical communities are devoting serious attention to the key problems of machine processing of information. About 10 years ago some of these problems were formulated in the form of the so-called program Kodda--a program for research in the area of databases and banks. With great scope and breadth the crucial problems of computerization of the society were handled in the Japanese plan of research and development in the area of the fifth-generation computers. Of the 26 problems formulated in it, an extremely important if not a primary position was assigned to the creation of data bases for the thinking computer.

The task of designing databanks for computers consists in attracting or, better, recruiting for this work mass group of programming and nonprogramming users. One of the stages in solving the problem is the restructuring of the system of training of specialists in this area and providing them with special literature which is written on a scientific and technical level in a clear language with a clear-cut formulation of the problems and ways of solving them.

The founder of the science of databanks, E. F. Kodd, gives a classical example of this approach to the problem. Abroad there are a number of books on designing databases and banks which combine accessibility of style with profound development of concrete issues. Some of them have been translated

and published in our country. Such names as J. Martin, K. Dait, J. Ulman, J. Habbard, C. Autrey and others, are quite familiar to our readers who are interested in this problem. In domestic literature we still have a shortage of this kind of publication. Because of this the book by L. V. Kokoreva and I. I. Malshinin is of great interest.

The book under review touches on many problems which pertain to the conceptualization and the logical and physical designing of databanks. The book is well-written. The introduction is successful--it briefly formulates the modern problematic of the research and its tendencies.

The book consists of two parts. The first part traces the stages of designing databanks consistently--from the simplest ideas and hypotheses to the construction of algebras:

the representation of objects and the selection of the model for the data;

automatic transformation of data models;

relational designing of the database;

languages for communicating with the database (relational);

the construction of associative (relational) memory of the database.

A great deal of attention is devoted to applying mathematical apparatus to solving various problems of databases, discussing and systematizing the most valuable results that have been obtained in this area and which are important for the development of databank theory, and also practical realization of these results.

With a constant increase in the volume and complexity of databases it becomes more and more important for their structure and content to meet the requirements for information processing that are imposed by specific areas. The information is stored in the database in keeping with a certain model which is created during the process of planning. The model depicted in the database should not only meet the current information needs of the particular area, but it should also maximally provide for the possibility of changing and expanding, that is, it should offer a certain level of independence of the data (physically or logically). The book considers models on which the majority of existing commercial and experimental systems of management of databases are based--relational, network and hierarchical. The most promising relational models and relational methods pass through all of the first part. The presentation is detailed and the examples are carefully selected, giving an integrated picture.

Relational methods in the first part of the book serve as a kind of guide channel for "navigation" through the problematics of the databases. Incidentally, in the practice of planning databases (network) the term "navigation" actually is used.

The second part of the book is a theoretical minimum on databanks. Chapters 6-10 contain a brief, carefully thought-out presentation of the theoretical fundamentals of designing databanks. The authors carry the presentation of the methods of designing databanks up to the construction of the system of the representation of knowledge with the help of semantic networks and frames. The clearness of the presentation is provided through mathematical methods, which make it possible to survey the entire spectrum of problems simply and in the style of computer models.

The book by L. V. Kokoreva and I. I. Malishinin is supplied with an extensive bibliography. The authors have done a large amount of work, having concentrated the materials on problems of designing databanks which had been dispersed through numerous domestic and foreign publications and works from conferences and scientific reports.

On the whole, the book is an important event in the life of scientific and engineering circles who are involved in the theory and practice of designing databanks.

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BOOK ON SOCIAL INFRASTRUCTURE REVIEWED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 2, Feb 85 pp 166-169

[Review by I. I. Kantor, candidate of technical sciences, Moscow Institute of Rail Transport Engineers, of the book "Zheleznyye Dorogi v Tayezhno-Bolotistoy Mestnosti" [Railroads in Marshy Taiga Locations] by G. S. Pereselenkov, Ye. P. Alekseyev, B. I. Solodovnikov, A. Kh. Alidzhanov, N. P. Murovanyy and D. I. Korotchayev, Moscow, "Transport", 1982, 288 pp]

[Text] Railroads play a special role in the economic development of eastern regions of the country. The selection of their routes, the location of the stations, the handling capacity of the lines, and the time periods for construction largely determine the distribution of territorial complexes, their capacities and their rates of development. The book by the Siberian author is devoted to the experience in transportation assimilation of Siberia and the Far East in recent decades. These authors include winners of the USSR State Prize for 1983 who earned it for their development and introduction of progressive technical decisions which provided for accelerated construction of railroads in petroleum and gas regions of Tyumen Oblast. The book discusses a broad range of problems related to the construction of railroads in eastern regions and analyzes the influence of the railroads on the development of productive forces. Special attention has been devoted to the Tyumen-Surgut railroad, the largest in the area, which became a support transportation network for the territory of Western Siberia.

By the time when Surgut was determined as the center of the future petroleum extraction region on the immense territory of Western Siberia there were practically no surface means of transportation that were in operation year-round. With the beginning of the petroleum and gas extraction the cargo flows increase to such a degree that the river fleet, which for a long time had been the main kind of transportation in the region, could not keep up with them; the navigation period is not very long here. The winter tracks which are widely used for delivering cargo as soon as the frosts begin have also ceased to satisfy the intensively growing demands for shipments. Two kinds of roads were in competition: year-round highways and railroads. When comparing the two variants, the authors show that the construction of highways would involve greater difficulties and monetary expenditures.

With the opening of the new deposits of petroleum and gas on the territory of Western Siberia there are roads that need to continue the Tyumen-Surgut line in two directions: one--toward Nikzhnevartovsk and the other--toward Urengoy. The book evaluates the economic effect of constructing railroads on the territory of Western Siberia, through which during the time of temporary operation alone the Ministry of Transport construction has transported more than 20 million tons of cargo. The efficient work of the division for temporary operation of Tyumen'stroypu't has contributed to early completion of the construction of the Samotlor-Kuybyshev petroleum pipeline. Because of the prompt delivery on the railroad that was under construction the turbine for the Surgutskaya GRES was installed 2 months ahead of schedule. According to data of Sibgiprotrans, expenditures on shipping a million tons of cargo to Surgut on the railroad, which had not yet been put into operation by the Ministry of Railways, were 16-18 million rubles less than the expenditures on transportation on the river with transshipment in the Tyumen, Omsk and Novosibirsk ports. According to the data from Glavtyumenneftgaz were presented in the book, transportation expenditures on the extraction of a ton of petroleum, because of the railroad, are now one-ninth off what they were previously when the cargo was delivered to the north of Tyumen Oblast by the river fleet, along winter tracks and by aircraft.

The book emphasizes that railroads are becoming the key links in the unified transportation system. Thus along with the construction of the Tyumen-Surgut line, in Tobolsk and Surgut they have begun to construct large river ports through which cargoes from the new construction projects have traveled along the Irtysh and Ob' to the places of assimilation of the new petroleum and gas deposits. Another example is the Achinsk-Abalakovo-Maklakovo line which sent the cargo flow of timber along the Yenisey to the northern sea route.

Linking the prospects of railroad construction in Siberia and the Far East to further economic development of the regions, the authors justify the need to continue the railroad to the northeast of Urengoy in order to assimilate the deposits of gas and petroleum in the area between the Taz and Yenisey rivers, and also for the needs of the largest industrial center in the Far North--Norilsk. Along with the task of continuing the Bamovskaya-Tynda-Berkakit line to Yakutsk and then to the seaports in order to assimilate the adjacent territories and the country's northeastern coastline, is very significant for assimilating the natural resources of the Ayano-Mayskiy and Tuguro-Chumikanskiy regions a line which connects the BAM with the Akhotka coast by the shortest distance.

The book notes the shortcomings in the planning and organization of the construction of railroads, which have limited the possibilities of utilizing the new construction sites for the needs of the developing economy of the region. Thus when calculating the handling and shipping capacity of the railroad during the period of temporary operation one should keep in mind that immediately after the tracks are laid national economic cargo travels along the line, and special points with dead ends and unloading areas are necessary for receiving it. These were not included in the plan for the Tyumen-Surgut line, and this led to a situation where the newly constructed railroad could not accept all the cargo that was being to petroleum and gas extraction regions.

Of principal significance not only for the construction of the railroad, but also for servicing the branches of the economy are trackside roads, without which construction work in marshy taiga areas is simply impossible. The experience in construction in Western Siberia showed that they are used by all departments that are conducting any kind of work in the region, and moreover the total flow of their cargo considerably exceeds the shipments for the needs of construction. The trucks hauling pipe with a heavy load on the axle are especially destructive to the traveled part of the road. Considerable forces and funds are required to repair the roads. Therefore the book draws a conclusion concerning the need, when developing technical plans, to envision in the sections for organization of construction expenditures on the maintenance of trackside highways in passable condition, and it suggests shared participation of the interested organizations and the construction of roads, and especially in their maintenance.

The authors correctly note that in marshy taiga localities it is necessary to have a permanent highway along the railroad line. It is needed by the railroad engineers, communications workers and energy engineers who service the structures out in the fields. The book does not give a recommendation of how to coordinate the need for a highway during the time of construction, on the one hand, and during the course of operation of the railroad, on the other. But the conclusion suggests itself: it would be expedient to plan and construct the trackside road in such a way that it will operate effectively both during the construction period and during the time of operation of the railroad.

A separate chapter of the book is devoted to the problem of protecting the environment during the construction of railroads. The authors consider technical solutions which are rational from the standpoint of the protection of nature. These include, in particular, the laying of a communications cable and the establishment of a support power transmission line on the side of the land dam of the railroad, as a result of which the width of the strip that is used will be reduced by 6-8 meters as compared to construction an overhead communications line with supports at the side of the railroad.

There is a heated discussion of how, because of unsolved problems, and not even complicated ones, during the course of research and construction irreparable harm is sometimes caused to nature. Thus the lack of devices to put out sparks that come from the exhaust pipes of all-purpose vehicles leads to fires; as a result of one of these a cedar grove was destroyed near Urengoy. The area of timber that is felled for no purpose near the pits that are envisioned in the plan but are not required for the construction has reached a thousand hectares on the Surgut-Urengoy line.

Attention should be given to the suggestions concerning rational utilization of natural resources during the course of construction. The authors recommend, for example, organizing local processing of noncommercial timber and scrap wood so that it can be used to manufacture wood chip or wood fiber slabs.

The book generalizes the experience in the construction of railroads under the difficult conditions of Siberia and the Far East. It will contribute to effective development of railroads--which are key elements of the infrastructure.

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PHYSICAL EXERCISE IMPORTANT FOR HEALTH

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 2, Feb 85 pp 170-172

[Introduction to following article by V. Ye. Raykhenshteyn, doctor of medical sciences, leader of the course in general physiology and sports physiology of the Novosibirsk branch of the Omsk Institute of Physical Culture: "Sports Without Records"]

[Text] Physical Culture has long been a constituent part of the overall cultural development of man. But civilization, paradoxical as it may be, has created a number of essential obstacles on the path to physical self-improvement.

Limited mobility--hypodynamism--has become almost a natural companion to the very concept of civilization and has become a source of many serious health problems. Hypodynamism is an insidious and merciless enemy whose consequences are not manifested immediately and are far from always reversible. We sadly notice relatively quickly its purely external, "cosmetic" manifestations, but we do not always think about the profound disturbances of the metabolism, and diseases of the heart, blood vessels and lungs that lie behind this.

The main reason is that man's natural motor activity is reduced in modern society because of mechanization of labor and life and the constant need for intellectual self-improvement. Therefore we have no time left to keep ourselves in shape and improve our physical condition.

Sports have frequently replaced our natural motor activity. New problems arise, and it would not be an exaggeration to say that sports are still too far from performing their major function--mass activity. Many people are still frightened by an incorrect idea of the need to "waste valuable time on physical culture and sports, the exhausting nature of the activities themselves, and the complexity and uncontrollability of the basic parameters of the organism. Here, of course, we have a confusion of the ideas of "sports for records" and healthful daily physical loads which do not require many hours or specialized medical supervision.

From this standpoint, the survey offered to the readers of the book by L. E. Morehouse and L. Gross, "Thirty Minutes a Week for Maintaining Physical

Fitness," which presents an accessible system in clear and engaging form, is unusually interesting and useful. The reader must be patient and read the survey through to the end since the proposed system requires thinking and it must be followed completely, "without cuts." There is no point in looking at the end and hurrying to follow the instructions to the lessons more quickly--this will be of no use if you are not able to pay the proper attention to the "long introduction." Actually, this is not an introduction but the first step to a well-thought-out system of exercises which, easy as they may seem to be, require a certain amount of self-exertion and, undoubtedly, will power, but the main thing is consistency.

The clear form of the survey repeats somehow the author's device which reduces the effect of the edification of something that has been heard for a long time, and the noncompulsoriness of the recommendations that are presented. The seriousness and the high qualifications of the authors of the book make the system scientific and useful. "Thirty Minutes a Week" is undoubtedly a journalistic exaggeration, a necessary hyperbole for drawing attention to a very serious problem. Still the proposed set and doses of motor activity actually are not burdensome, not cumbersome, and in combination with intelligent consumption of calories, can provide success to those who have thought seriously about their physical condition. Well, self-monitoring of the basic parameters of blood circulation and respiration, which each person is capable of, needs no recommendation.

While walking the good path, readers, do not forget to verify your success with the mirror, the scales and your sense of yourself.

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BOOK ON PHYSICAL FITNESS REVIEWED

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[Review by N. N. Dombrovskiy, biologist (Alma-Ata) and M. N. Levina, journalist (Novosibirsk) of the book by L. E. Morehouse and L. Gross, "Total Fitness in Thirty Minutes a Week," Granada Publishing Ltd., Mayflower Books Ltd, 1977]

[Text] Has it ever entered your mind, dear reader, that at any moment you can return to yourself or acquire a new excellent physical condition, even if up to this point you have never engaged in physical culture or taken care of your health at all? You doubt this? But still it is true.

We are convinced of this by Lawrence E. Morehouse--a philosopher, physiologist and director of the laboratory of man's physical achievements at the University of California, and Leonard Gross--a journalist. Their book, "Total Fitness in Thirty Minutes a Week," became a No 1 bestseller in 1977. At first glance, the look which the authors immediately give us into the headings of the book could cause disbelief in the careful reader, but if we tell you that Dr Morehouse was especially invited to train American astronauts in his system of maintaining physical condition during a space flight under conditions of weightlessness, then possibly you will be interested in what he offers to such ordinary people as you and me.

How does one achieve excellent physical condition? How does one not only preserve existing physical resources, but also increase them? How, without subjecting oneself to self-punishment, does one get rid of excess weight? How does one achieve all this without turning one's life into an endless and tedious performance of duty, into an obligation which when we neglect it gives us a feeling of guilt and inferiority complex? And all this in 30 minutes a week?!

When beginning their cooperative work the authors decided that they would write a book especially for those who want to live a long, healthy and active life and, as Dr Morehouse put it, "not feel tired as hell at the end of the day." The basic point of the Morehouse method is that it is not at all necessary to work "to exhaustion" in order to retain or acquire excellent physical condition.

"Excellent physical condition is simple," the authors of the book assure us. To do this it is not at all necessary to exercise until one is completely exhausted. It is not necessary to avoid any particular food or drinks and it is not good to think that the goal is impossible in this case. The only thing which you need is a watch with a second hand and the habit of checking your own pulse, that is, the rhythm of your heart contractions, in everything. But before beginning to master the method it will be necessary once and for all to get rid of some widespread myths which are current in the sports world and have successfully conquered us. We do not consider it correct to directly compare "major sports" to those tasks which are pursued by health sports, but it seems to us that even we have been infected by some "myths."

Let us follow the authors and try to orient ourselves in the stream of information and misinformation that accompanies the cult of physical culture. For if you have actually decided to get into shape, you will need the available scientific guidance and not amateur advice which is handed over from mouth to mouth and which the majority of us use when we begin to work independently.

Myth No 1. "Never drink when exercising." In the opinion of the authors there is nothing more erroneous than this assertion. If you feel that you are losing a lot of water you should replace it immediately. The cells of your body simply cannot function normally if they do not have enough water: the muscles will tire quickly and the heart will receive an excessive load.

Myth No. 2. "Sugar increases the energy level." In fact sugar which is eaten before the physical load can cause more harm than good. Too much sugar can never make up for inadequate energy.

Myth No 3. "Before physical activity it is necessary to avoid certain kinds of food." Nothing of the kind. The authors participated in a very interesting experiment. From all the possible literature on nutrition they drew up a "black list" of dishes which are forbidden by specialist before physical exercise. From these dishes they drew up a menu for athletes in a sports camp. To the surprise of the specialists it turned out that the forbidden food had no adverse effect on the health of the sportsmen or on the results of their sports activities.

Myth No 4. "Do not eat before swimming." The authors could not learn the origin of this myth, but they assert that neither history nor science confirms it.

Myth No 5. "A surplus of proteins makes you stronger." It is impossible to store up protein for the future. The human organism, of course, can withstand a great deal. Morehouse tested the majority of ideas on himself, and he also tried to deprive himself of proteins. He and his comrade lived for a month without proteins under the observation of the Harvard Fatigue Laboratory. And what happened. Not until the end of the month did they observe a shortage of vitamin B in the blood. It turns out that our organism has so much protein and fat that there is enough of them to last for a long time, but one should not fast unless there is a special indication for this since long fasting

causes interruptions in the operation of the gastrointestinal tract and severe weakness. Hence the authors came up with the concept of an "extensively varied diet" to which we shall return.

Myth No 6. "It is necessary to sweat thoroughly before physical exercise." Wrong. It is much better to take a cold shower. Changing from absolute rest to a heavy physical load in a short period of time can turn out to be difficult, especially for a person with a weak heart. But if you intend to gradually increase your activity without overexercising, there is no point in working yourself into a sweat. The best clothing for exercise during hot weather is your bare skin. Pleasant cooling down during exercises is not a shortcoming. And if you spend all your energy warming up, there is none left for performing the exercises.

Myth No 7. "Put on a sweater after exercising." There is no point in keeping yourself warm after physical exercises. You will not protect yourself from a cold, and it will not threaten you. It is best to return your body to its normal condition, letting it dry out freely. After this you can put on a sweater so that you do not start shivering.

Myth No 8. "Take a cold shower after a hot one in order to close the pores." If you like to take a cold shower immediately after a hot one you may do that. But if you tolerate this like a stoic, by no means should you do it. You are placing your organism under unnecessary stress.

Myth No 9. "Big muscles make you stronger." This assertion was very popular about 30 years ago. Now we know that inflated muscles are not a sign of physical strength. Everyone would like to make an impression with his external appearance, but this should only be a byproduct of good physical condition. The final goal of the exercises for the nonsportsman is good physical condition, cheerfulness, and the ability to withstand stress and overloading.

The authors draw our attention to the fact that when we are faced with mythical, impossible goals, we are undergoing a fiasco. Instead they offer us their own program of physical training which is based on the theory of normal physiology and a great deal of practical experience. First of all, the authors assert, one must not turn physical culture into a means of self-torture. Such exercises lead to injuries and disenchantment, and nobody needs that. Before you have become familiar with the Morehouse training methods, you must answer a question for yourself:

Why Do You Need Good Physical Health?

Let us assume that your normal living conditions meet your social and psychological demands. Your job completely provides for the well-being of your family. Would it not be better for you if suddenly you were to earn twice as much? Perhaps you would still prefer to devote your free time to your favorite entertainment?

This means that first of all it is necessary to single out your most important goals in life. You may boast to your friends that you can do so many pushups

and this will give you satisfaction. But does the ability to do pushups help you in real life? Excessive training in any kind of particular sport or exercise cannot provide either additional advantages or better health or even preparation for daily life.

The program with which we wish to familiarize you will make it possible, the authors promise, in 30 minutes a week, with the special exercises which are calculated according to the frequency of the pulse, to achieve good physical condition.

Each type of physical exercise develops particular systems of the organism. There are many excellent amateur sports, but long-distance running, for example, does not develop the ability to do short powerful bursts which may be needed in life, and the sprint does not provide one with endurance. For multifaceted development it is necessary have the most varied exercise.

In order to select the assortment of physical exercises, we must be well aware and arrange the program in such a way that it corresponds to our personal goals. If you are physically not strong enough or do not have enough endurance, then your goals should be to restore your complete physical fitness. This complete physical fitness still does not mean absolute health--it means, rather, a basis for restoring the health and any kind of activity. And this is still not training in the sense in which we understand this word, but physical fitness should precede any kind of training. The fitness program is not suitable for a sick person, but a person can begin it immediately after he becomes well.

Health, physical fitness and sports achievements are quite different concepts: you can be healthy without being physically fit and, finally, you can have fairly good results in any kind of sports without being absolutely healthy. One more myth is the widespread opinion that sports can make a person healthy. Denying this thesis, the authors give examples in which sports which were beyond their abilities have made certain sportsmen ill people.

The best variant for each of us is when physical fitness, absolute health and sports successes go hand in hand. The task Morehouse and Gross set for us is to get past the first stage, that is, the achievement of physical fitness.

What do the authors mean by physical fitness? First of all, the development of endurance of the cardiovascular system and flexibility of the local motor system.

And so the basic goal of the book is to teach us to be in good shape, to look and feel well in daily life, so that by the end of the working day we are still active and in a good mood.

In each of our lives there comes a day when we suddenly notice that our shoulders are drooping and our bellies are impudently protruding. One gets the impression that our entire bodies have slumped into the middle. Unpleasant thoughts begin to creep into our mind, for example, that at our last physical examination the doctor told us that we should start being concerned about our heart. Something must be done! This correct idea usually

gives us impetus to force ourselves to take up some kind of regular, currently fashionable method of maintaining the health.

Many of Dr Morehouse's patients, just like many of us, resisted any kind of physical load, including ordinary daily exercises. Then some of them changed their style of life slightly, for example they began to walk upstairs to their apartments instead of taking the elevator. And the results were not slow in manifesting themselves! Having analyzed the reasons, the doctors discovered to their surprise that simply changing the habit of taking the elevator affected their views on life and on their personal situation: they began to smoke less or they stopped altogether, they avoided too much food or poor food, they began to drink less and to sleep better. One intelligent effort caused them to remember other natural and healthful habits as well.

How Does One Determine One's Physical Condition?

Let us assume that you are a very healthy person. You have always been active and in your family it has not been accepted to suffer from every fashionable illness that comes along. You are in good shape. But something happened to you at work and you were away from your desk for a month. By the end of this month you lose about 80 percent of your physical conditioning.

And now let us assume the opposite: You have avoided exercise all your life. In just a month you could raise the level of your physical fitness from almost zero to that same 80 percent.

It seems that some people deliberately avoid being in good shape. They like to be weak and dependent. They like to have people be concerned about them. They are glad to avoid additional duties. Through their stubborn resistance to any kind of activity they reach a point where their organism does in fact become fragile and weak. But we hope that our readers are in a different category and it is only the nature of their work or the conditions of their lives that keep them from being in good shape.

Where Should You Begin?

Take a hard look at your way of life and figure out for yourself to what extent it corresponds to your own ideas about health norms. Here it is not necessary to be a great specialist: common sense will tell you how your life corresponds to the norm. You should look more attentively at your behavior, your work and your home situation and decide which of the factors need changing. The first steps include no exercises:

it is necessary to recognize the importance of physical activity. If you really want something you will find the time for it;

make up a list of kinds of activities that are acceptable to you;

try not to deviate from the schedule you have arranged. It is possible to think of all kinds of justification for not exercising: "This goes against my habits"; "Nobody does this any more"; "People will laugh at me"; "I do not have time"....

All these are excuses of weak people. In order to work effectively it is necessary to be entertained by the program you have compiled for yourself and to love it. And the program should indeed be drawn up especially for you.

A Program for Me Personally

These words should be your directive. You will be working alone and nobody will know about it unless you want them to. The exercises should not contain any kinds of activity which you do not like. After all, for everyone who likes to jog there are probably several thousand of those who dislike this kind of amateur sport. If you are one of these several thousand, for you personally it would be better not to include jogging in your activities. Physical activity is at the same time sensual activity. Therefore when you have to move you should do this on the basis of grace that are inherent in you. The strains should be slow, gradual and not excessive. The exercise should be more like a dance in your favorite rhythm. Your muscles should respond to the sense of bodily well-being which you arouse in yourself with the exercises.

Unfortunately, you have fixed in your mind the type of exercise that is more like a tortuous drill. It is not easy to replace this stereotype in your awareness, and it very much impedes a positive attitude toward physical exercises. But if you work out in your own room and nobody is standing over you, you will not have to look at the second hand in order to "push" yourself. Not the second hand, but the rhythm of your heart will control your individual load and rate of movement.

In the exercises that are suggested henceforth the main goal is to improve and regulate such functions of the organism as strength and endurance. Here there will be no strictly given rate, distance, time, positions or range of movement. Each person will adjust the parameters to his own requirements and even ideas. "Physical drill" looks good on the report, but it is not very useful," the authors think.

When preparing the program for the astronauts Dr. Morehouse came up against attempts on the part of military medics to introduce a strict program of physical training. But the first time the astronauts flatly rejected rigid regulation. It seemed to them that each should work in his own way and train according to an individual program. The arguments which they used are fully acceptable for each of us. But one idea should be strongly planted in your mind: you will absolutely be successful! And, perhaps, do not forget about the widely known truth: to adapt one's organism even to a limited, but necessary load is somewhat more difficult than the sedentary or prone way of life....

An extremely convincingly example of the consequences an inactive existence, which is given by the authors of the book, is the example of the American astronauts. In the first week of space flight they lost 10 percent of their bone tissue, and in the second week the losses reached 15 percent.... The question arose: in general can remain in space for very long? But then it became clear that within 50 days the losses began to be restored. The

astronauts reach a stable physical level. It is lower than the one with which they started, but it is quite adequate for work under specific conditions. Why conditioning for the heart?

No one needs to be convinced any longer that the heart needs exercise. With exercise it receives more oxygen, it becomes bigger and stronger, and it works more effectively. A heart that is in good condition beats more slowly both at rest and during work. It has a greater "pumping" capacity.

There is another argument in favor of conditioning. Special exercises for the entire organism provide the heart with a "secondary" strengthening system. Every one of our muscles is auxiliary for the heart. When the muscles contract they help to transport blood to the heart. If instead of muscles a person has excess fat, he exhausts his heart. Excess deposits mean also excess capillaries which the heart must also serve.

Rhythmic, continuous exercise during which the muscles pump by turns are a suitable condensor for the heart. When the blood is pumped out of the muscles it always goes toward the heart. Physiologists call this action "venous return." Muscles participating in this strengthen its effect. Rapid heart beating in and of itself, for example, from agitation, does nothing. The muscles do not have to complete the work, the heart is underloaded and it "idles." This does not mean that it is resting.

From time to time you walk near a table or chair during work, the work itself can only improve because of this. You probably know of the type of people who like to solve mental problems while walking--this produces the impression that they are not serious, but it is not without meaning. True, these people are frequently advised: sit down and think about it well." From the standpoint of normal physiology, this approach to mental work does not seem to have any point. Therefore it is really too bad that the training process requires constantly sitting in one place. It turns out that from childhood the mastery of knowledge is artificially held back, and then the specialist--having been a sedentary school child--the rest of his life makes up for the mistakes of an incorrect school education.

Dr. Morehouse draws the attention of the readers to the fact that all of the cardiologists he knows are always exercising. Regardless of who they are they take their proper physical exercise in order to maintain their heart activity.

In What Measurement Do You Live?

The life process has two measurements. One is the absolute number of days lived, and the other is the completeness of life. If you will exercise you will prolong the number of days lived and there is a guarantee that you will live them with satisfaction and usefulness.

Once a group of physiologists developed a program of physical exercises for managers. In order to be sure of the effect from the efforts that were made they tested them in laboratory tests. It was discovered that not only external, objective changes noted by physiologists had taken place, but the managers noticed objective, personal positive changes, for example, increased

ability to work after dinner and, which is of no small importance, greater confidence in everything they undertook to do.

The most difficult thing in carrying out any program is personal regulation. We have already become accustomed to demanding and receiving help from the outside and rejecting any effort to control ourselves. There is little doubt that the numerous diets, for example, those which promise easy and rapid return of a beautiful body, have helped few people, mainly not because they are bad, but because it is difficult to find a person who will follow them unwaveringly. Many people think that they would rather not live as long, but without deprivation, than to live a long and dull life. This is what is said by those people for whom a dinner without steak means a meager existence. We destine ourselves to one way of life or another.

But in fact, when we engage in physical exercises according to our pulse rate, there is no need to exhaust and torture ourselves with special diets in order to keep our weight at the level at which we like it. It is sufficient to recall the law of preservation of energy: the energy which you expend must first go into the organism in the form of food. And if you use more energy than you consume, you will inevitably lose weight. And, conversely, 100 kilocalories is enough to change the balance in either direction. Either you eat less or you increase your physical load. The fat cells in an organism are the storehouse "for a rainy day." Today, when all one has to do for food is to go to a store and not go hunting, it is necessary to store up reserves.

The first step in wage regulation should be recognition of the simple fact that the nutritional habits that you have developed are not at all necessarily the ones that you should have....

(continuation follows)

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EMINENT ECONOMIST REMEMBERED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 2, Feb 85 pp 183-186

[Article by V. A. Kolmyk, candidate of economic sciences, Institute of Economics and Organization of Industrial Production of the Siberian Branch of the USSR Academy of Sciences (Novosibirsk): "Mikhail Yakovlevich Sonin"]

[Text] Dr of Economic Sciences and Professor Mikhail Yakovlevich Sonin, a senior scientific associate of the Institute of Economics of the USSR Academy of Sciences died on 8 September 1984 in his 74th year of life.

M. Ya. Sonin is one of the founders of the theory of labor resources. His fruitful ideas gave impetus to the development of this young science. In M. Ya. Sonin's works one can find multifaceted approaches to the study of labor resources and the development of methods of controlling them with the help of the demographic policy, the employment policy, legal legislation, social and public measures, and so forth.

M. Ya. Sonin's books are devoted to vital problems of labor and reproduction of the labor force under socialism. They clearly present the author's scientific concept of employment of the able-bodied population which approaches that of the Strumilin school. Along with S. G. Strumilin, M. Ya. Sonin participated in compiling a section devoted to labor under the 3rd and 4th Five-Year Plans and in the creation not long before the war of a state system of labor resources whose basic principles are retained in the present system of the GPTU. Retaining the traditions of the Strumilin school, he successfully combined theoretical developments with the results of economic and sociodemographic research. M. Ya. Sonin himself educated a large group of students (the author himself is among them). With his works M. Ya. Sonin always provided an example of scientific boldness, commentarial keenness and sharpness, and the ability to get right at the meat of crucial socioeconomic problems.

Mikhail Yaklovevich began his labor life in Smolensk as a manual welder. At 17 years of age he became a Komsomol member, at 20 he entered the Moscow Planning Institute and in 1934 upon his graduation he was sent to work in the USSR Gosplan where he worked for 15 years. Here in 1944 he became a member of the CPSU. As the manager of the sector for personnel training he participated

activity in drawing up the military and economic plans during the years of the Great Patriotic War and was responsible for providing labor force for enterprises that created the "Katyusha," and, along with other responsible workers, he prepared government decisions regarding labor resources. For this work which was so necessary at the time, at the suggestion of the chairman of the USSR Gosplan in 1984 he was awarded the Order of the Emblem of Honor, and a medal.

From 1930 until the end of his life Mikhail Yakovlevich was a scientific associate of the Institute of Economics of the USSR Academy of Sciences. Here he continued his work which was related to national economic planning of labor resources in many regions of our country (the Volga area, the Central Asian republics, Transcaucasia, Kazakhstan and the Yakut ASSR).

Mikhail Yakovlevich was a constant member of the correspondence commissions of the USSR Central Statistical Administration in 1959, 1970 and 1979, and a member of the scientific and economic council of the State Committee for the Utilization of Labor Resources under the RSFSR Council of Ministers and the Scientific Council for Problems of Population and Labor Resources under the Presidium of the USSR Academy of Sciences.

M. Ya. Sonin began to publish in 1934. He has published more than 180 works, including eight books. Many of his works have been translated and published abroad (in Warsaw, Prague, Budapest, Berlin, Bucharest, Beijing and New York). A high rating both in our country and abroad has been given to the fundamental monographs of M. Ya. Sonin, "Reproduction of the USSR Labor Force and the Balance of Labor" (1959) and "Crucial Problems of the Utilization of Labor Force" (1965).

Mikhail Yakovlevich was able to brilliantly combine his practical and scientific activity with pedagogical work. Beginning in 1946 he worked jointly as a teacher of political economics and economics of labor at the MGEK and the Higher School for Occupational Advancement of the AUCCTU, and at the same time he conducted educational work in the republic of Cuba.

The public lectures of M. Ya. Sonin--an active member of the Znaniye Society--and his presentations at scientific and practical conferences were always distinguished by a bold and pointed statement of the problem and were original in form. "It is interesting even to argue with you," his opponents told him.

The magazine EKO (No 3, 1981) published a review of a collection of scientific works by M. Ya. Sonin, "The Development of the Population (The Economic Aspect)." In this collection was concentrated a considerable share of the scientific ideas and results of socioeconomic research of the author during 35 years of scientific activity. The collection reflected the effort with which M. Ya. Sonin consistently defended the need to draw up balances of labor force with a detailed demographic and administrative-economic division, in order to contribute to satisfying both public and individual needs for labor. His proposals concerning strengthening labor discipline and constructing balances of working time and new organizational forms of distribution of personnel remain timely up to this point. Nor have his ideas about the development of female ergonomics and labor placement of pensioners become outdated.

In 1984 a book came out by M. Ya. Sonin with A. A. Dyskin as a coauthor in which the authors in bright, popular style showed the role of middle-aged people in our society, the causes and consequences of the aging of the population, ways of fighting against premature aging, problems of interrelations between parents and adult children, grandparents and grandchildren, and they considered problems of the utilization of labor of elderly people. At the end of the book the authors write: "In conclusion we should like to emphasize once again that the problem is not that there are more and more elderly people, but that they are frequently not employed in the work and the place where they could bring the greatest advantage to themselves, the people around them and the society as a whole, and this problem must be solved comprehensively."

Prof M. Ya. Sonin had a unique personality. He tried to introduce many of his ideas into life himself. "Premature aging and senility," he wrote in his last book, "need not be accepted. Walking and running are for any individual the most natural, generally available and effective means of avoiding various ailments." Mikhail Yakovlevich not only wrote about the usefulness of running, but he himself ran and headed a section for running at the Moscow House of Scientists. In one of his letters during his 70th year he wrote: "As for my birthday, soberly looking lucosis in the face, I have decided to leave science in the very most modest way, but in good shape." And this is what he did. "Written off" by the medical experts and himself not yet knowing the means of treatment for such a disease, M. Ya. Sonin through his active and all-around activity himself prolonged his own life for several dozen years. The last time I met with Mikhail Yakovlevich was not long before his death. He was alone in his apartment sitting at a table filled with manuscripts, page proofs of his future publications, notes about whom he should call in order to chat about something, and so forth, that is, right up until the last days of his life he was at his post. In the memory of all his friends, scientific colleagues and students he will always remain an example of hardiness and scientific longevity.

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EKO CONFERENCE HELD IN YEREVAN

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 2, Feb 85 pp 187-188

[Article: "Readers' Conference in Yerevan"]

[Text] The conference was organized by associates of the Yerevan Institute of the National Economy. It was conducted by its rector for scientific work, doctor of economic sciences, Prof Yu. T. Movsesyan. The deputy editor in chief of the magazine EKO, B. P. Orlov, announced the future plan for publications and answered questions from participants in the conference. Representatives of republic economic management agencies, industrial associations, scientific institutions and VUZes who spoke then, having supported the main directions of the activity of the Editorial Board, expressed a number of critical remarks and constructive considerations.

Thus the deputy minister of light industry of the Armenia SSR, V. Nranyan suggested that the problem of production and sales of consumer goods be discussed more frequently on the pages of the magazine. He drew attention to well-known omissions in the planning of their production, the difficulties in selling certain goods, and the consequences of overstocking (fine sanctions, losses) which complicate the work of the enterprises. Similar issues were raised in the statement by the general director of the Sovetashenskiy Knitwear Association, A. A. Tosuyan.

A responsible worker of the republic state committee for prices, A. I. Rafaelov and the chief of the scientific sector of the Yerevan Institute of the National Economy, F. A. Gushchyan recommended that the magazine devote more attention to elucidating problems of price setting and particularly that it given an analysis of various concepts of price setting and the substantiation of the structure of prices for industrial products.

The head of the department of political economics of the Yerevan Institute of the National Economy, doctor of economic sciences, Prof N. M. Manaseryan and certain other speakers noted the inadequate attention on the part of the editorial board to the publication of materials on theoretical issues. It was also noted that, although it published a number of materials which show shortcomings in the practice of management, the magazine did not devote enough

attention to constructive problems in the restructuring of the management of industry and the effectiveness of cost-accounting relations.

The director of the Yerevan Scientific Research and Planning Institute for Automated Control Systems of the City, candidate of physical and mathematical sciences, E. A. Vartapetov, familiarized those in attendance with the results of the work of the institute related to the study of socioeconomic problems of Yerevan. In particular, objective processing of a mass of information which reflects the needs of the city's population for housing, made it possible to determine a rational order for offering it to the workers.

A docent of the Yerevan Institute of the National Economy, candidate of economic sciences Ye. Minasyan announced the utilization of the magazine's materials in the training process. The director of the house of technical equipment of Sovetskiy Rayon in Yerevan and other speakers recommended that the journal publish more materials on the practice of introducing technical innovations, the role in this of design services and engineering and technical personnel of the enterprises, the functions and rights of the foreman and his material and moral incentives, and so forth.

Prof Yu. T. Movsesyan suggested that the Editorial Board more frequently publish materials on practical utilization of economic and mathematical methods in planning and management of production. In his opinion, the reform of secondary education logically leads to a restructuring of the system of higher education and it would be desirable for the magazine to publish materials devoted to this.

A number of the speakers, particularly the department head of the Yerevan Institute of the National Economy, candidate of economic sciences, Docent A. A. Khondkaryan, asked the editorial board for more extensive elucidation of foreign experience in production management, wages and so forth, and the publication of articles on the development of economic sciences abroad. It was also recommended that they more frequently publish materials devoted to the sociopsychological aspects of management in industrial enterprises.

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HERE'S WHAT COMES FROM 'MAKING WAVES'

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 2, Feb 85 pp 189-190

[Article by M. Belen'kiy (Kiev): "An Atypical Case"]

[Text] Ivanov: Well, let's....

Petrov: No!

Ivanov: Why?

Petrov: Because nobody has done that to me yet.

Ivanov: Well, let us do it! We will be the first.

Petrov: By no means! It is forbidden.

Ivanov: How do you know that?

Petrov: Well, you show me where it is written that it is permitted.

Ivanov: But after all you cannot write down everything that is permitted! Otherwise it would be necessary to keep writing into infinity. For example: It is permitted to eat cabbage pie, to jump on one leg, to drink tea, to run....

Petrov: Show me where it is written!

Ivanov: What?

Petrov: What you just said. That everything is permitted except what is forbidden.

Ivanov: But, after all, that is not necessary....

Petrov: To whom?

Ivanov: To everyone.

Petrov: Where is it written?

Ivanov: Everyone knows.

Petrov: Everything that is necessary is determined by higher instructions.

Ivanov: There is such an instruction. Here. Read!

Petrov: So.... Display initiative. What is the date here? A very good instruction. Now let us wait for specific instructions. To whom should we manifest it, on what date and who should be held responsible.

Ivanov: If we do this they will promote you.

Petrov: I doubt that. And if I do not do it they will not do anything to me. And that is the main thing!

(Telephone rings)

Petrov: What? Fire me because of a lack of initiative? And who is to take my place? Him?! (He replaces the receiver and turns to Ivanov). You heard the last instruction? They are appointing you to my job.

(Ivanov sits in Petrov's chair. Sidorov enters.)

Sidorov: Well, let's.

Ivanov: No!

Sidorov: Why?

[See beginning]

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